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THE IRON AGE

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October 28, 1937

ESTABLISHED 1855 Vol. 140, No. 18

Sea Lawyers on Land

SEA LAWYER is a term that is applied to a sailor whose principal pleasure in life is to nurse grievances. Instead of spending his spare time studying books on navigation and seamanship so as to fit himself for a better job, he puts in his off hours pouring over books on maritime law, so as to miss no opportunity for registering complaints with or against the ships officers.

Sea lawyers have their following aboard ship, for there are always a certain kind and number of people afloat or ashore in any group who delight in seeing the boss bearded. And there are always opportunities for doing this because no one can be perfect, however well intentioned. And the sea lawyer can and does magnify unimportant technical infractions into imagined persecutions.

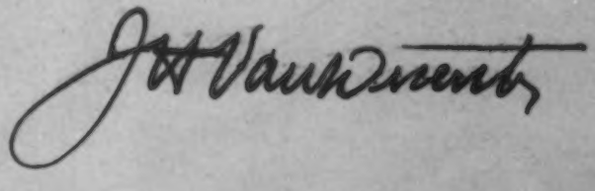
When it comes to a show-down in Admiralty court, sea lawyers do not get very far as a rule, because the members of the court are usually practical old sea dogs who have had experience in handling men and who can spot a troublemaker at a glance. Imagine what would happen if this were not so and if disgruntled troublemakers of this sort could bring their complaints before a court or board whose members knew nothing of seamanship or seaman nature. Captains would spend most of their time ashore instead of afloat and in court instead of on the bridge.

This is exactly the situation which faces the industrial captain on land today, in connection with complaints laid against him before the National Labor Relations Board. Not only do the members of this board know nothing whatever about industrial situations and industrial management, not only have none of them had any experience in handling men or in directing successful enterprises either large or small, but on top of these deficiencies, they appear to have the fixed idea in each case that the complainant is a persecuted, long suffering martyr and that the boss complained against is something known by a term not fit to print.

Only this situation could account for the reams of drivel which are solemnly accepted as "testimony" in nearly every case which comes before the Board. In one of the recent cases, for example, the complainant produced a little notebook in which he had carefully jotted down, over a period of more than 10 years, every fancied grievance against his foreman and superintendent.

Before any court whose members were both fair-minded and "dry behind the ears" in their knowledge of human nature, such evidence would cause the complainant to be kicked out of court because of prima facie proof that such a person has an incurable persecution complex and needs the attention of a psychiatrist.

It is bad enough to have a confessed Klu-Kluxer as a minority of one on our Supreme Court bench, but perhaps not more harmful to the public than to have an overwhelming majority of biased incompetents on our Labor Boards.



Metals

meet at America's Playground

THE continuous broad smile on the face of W. H. (Bill) Eisenman, long time secretary of the American Society for Metals, was the best evidence that the 19th National Metal Congress and Exposition had gone over — and gone over big. All records as to attendance, number of exhibitors and floor space occupied were broken, and that despite the fact the congress was held in a seaside resort, 50 miles or more from the nearest industrial center. During the week of Oct. 18, about 10,400 metallurgists, research men, engineers, production supervisors and industrial executives made the trip to Atlantic City to view the 235 exhibits, listen to some of the 145 technical papers, meet their friends, walk the boardwalk and enjoy themselves generally. As in other years, three other societies cooperated with the A.S.M. in the planning and execution of the simultaneous sessions; namely, the American Welding Society, the American Institute of Mining and Metallurgical Engineers and the American Society of Mechanical Engineers.

THE 19th National Metal Congress and Exposition, held in Atlantic City, N. J., Oct. 18 to 22, broke all records as to attendance, number of exhibitors and floor space occupied. More than 10,000 metallurgists, engineers, production supervisors and other executives attended the many technical sessions of the four cooperating societies, listened to the presentation of 145 papers, and visited the booths of 235 exhibitors whose displays occupied more than four acres of floor space in the Auditorium. Sponsored by the American Society for Metals, the congress was also participated in by the American Welding Society, the American Institute of Mining and Metallurgical Engineers and the American Society of Mechanical Engineers. A.S.M.'s Metal Man and official family shown on opposite page. (Left to right) J. P. Gill, W. H. Eisenman, G. B. Waterhouse, W. P. Woodside and Edgar C. Bain.

Perhaps as much due to the floor plan of the auditorium as well as to the help of professional exhibition designers, the Metal Exposition gave more of an appearance of unity in treatment and planning than has been noted heretofore. The displays were attractively arranged, presented a tremendous amount of visual data in the form of product samples, charts, and machines in actual operation. This was particularly true of welding and cutting equipment, heat-treating furnaces, plating machines and degreasing tanks. The steel company exhibits dominated the central aisles and all the affiliated metals and metal working techniques seemed to tie-in with the basic industry and basic material suppliers. Over 160,000 sq. ft. of floor space was devoted to these displays.

At the annual banquet of the A.S.M. the newly elected officers of the society were presented. Dr. George B. Waterhouse, professor of metallurgy at Massachusetts Institute of Technology, Cambridge, Mass., succeeds as president Dr. Edgar C. Bain, assistant to the vice-president of the United States Steel Corp. New vice-president is William P. Woodside, vice-president in charge of research, Climax Molybdenum Corp. of Michigan, Detroit. Treasurer is Bradley Stoughton, dean of engineering, Lehigh University, Bethlehem, Pa. Trustees are H. A. Anderson, metallurgical engineer, Western Electric Co., Chicago, and J. P. Gill, chief metallurgist, Vanadium-Alloys Steel Co., Pittsburgh.

An array of distinguished members of the society sat at the head table, including past and present officers, chapter chairman, recipients of scrolls of appreciation and the dean of them all, Dr. Albert Sauveur of Harvard University. As the presiding officer, Doctor Bain presented on behalf of the society a scroll to W. P. Sykes, metallurgical engineer at the Cleveland wire works of the General Electric Co., for his Edward DeMille Campbell Memorial Lecture, presented at one of the earlier sessions and abstracted at some length in this issue. Scrolls were also presented to Earnshaw Cook, research metallurgist, American Brake Shoe & Foundry Co., for his series of five lectures given on open-hearth steel making; and to J. R. Vilella, research laboratories, United States Steel Corp., for a similar series of educational lectures on metallographic technique. To Robert S. Archer, chief metallurgist, Republic Steel Corp., was presented a scroll expressing the appreciation of the society for his efforts as president during one of the trying depression years.

For the most meritorious paper given before the society between September, 1935, and June, 1936, the Henry Marion Howe Medal was presented jointly to Dr. Eric R. Jette, associate professor of metallurgy, School of Mines, Columbia University, and to Dr. A. G. Anderson, director of the depart-

PHILIP GEORGE LANG, JR.

ment of research and development, Phelps-Dodge Corp., for their paper, "An X-Ray Investigation of Iron, Silicon and Carbon in Steel."

Upon conclusion of the formalities, the 450 members and guests, many of them ladies, were treated to a unique demonstration of mind reading by Dunninger of the National Broadcasting Co., who mystified and entertained those present for an hour and a half.

President's Background

Dr. George Booker Waterhouse, newly elected president of the A.S.M., has been professor of metallurgy at M.I.T. since 1922. Born at Sheffield, Eng., in 1883, he came to this country in 1903 and became a naturalized citizen in 1910. The University of Sheffield, which gave him his batchelor degree in 1901, conferred on him the honorary degree of Doctor of Metallurgy in October, 1937, *in absentia*. Upon the completion of a thesis on nickel steels, Columbia University granted him a Ph.D. in 1907. For 18 years prior to his connection with M.I.T., Doctor Waterhouse was associated with the Lackawanna Steel Co. at Buffalo as metallurgical and inspecting engineer. For many years his wide consulting practice has kept him in touch with practical operating problems of all phases of steel making. His field of concentration has been alloy steels and as chairman of the Iron Alloys Committee of the Engineering Foundation, Doctor Waterhouse has been co-author of the series of monographs published by that group.

A highlight of the A.I.M.E. program was the joint dinner of its Institute of Metals and its Iron and Steel divisions with the Machine Shop Practice division of the A.S.M.E. Francis B. Foley, chairman of the Iron and Steel division and superintendent of research of the Midvale Co., presided. Among those he introduced were two distinguished foreign visitors from

H. SIDNEY SMITH

England, K. Headlam-Morley, of London, secretary of the Iron and Steel Institute of Great Britain; and Dr. Richard Seligman, past president of the Institute of Metals of Great Britain. Both graciously acknowledged the hospitality of their American hosts and accepted the invitation extended to both British groups to join in the 20th Metal Congress to be held in Detroit during the week of Oct. 17, 1938.

The Engineer in Modern Life

Speaking on the place of the engineer in modern life, Dr. Harvey N. Davis, president of Stevens Institute of Technology, Hoboken, N. J., painted a broad picture of the field of engineering. The general conception of the engineer is as nothing but a master technician. Doctor Davis believes the engineer has been more than that for some time.

"A hundred years ago the engineers of the world were almost exclusively expert technicians. They were building roads and bridges and canals. The steam engine had only recently attained a status of practical usefulness and they were busy learning how to build it in various forms and sizes accurately enough and cheaply enough to bring it into widely diversified service. They were also busy developing the textile and other machinery which it was to drive, and designing and building the mills and factories to house that machinery. And most of all they were busy developing the machine tools that alone could make considerable progress possible either in the generation or the utilization of power. Furthermore, railroads had only recently begun to rival canals as a means of wholesale transportation and the engineers of a hundred years ago were barely beginning the long job of conquering the wilderness with their twin strands of iron, and of developing and improving the locomotives and cars that were to run on them.

COL. GLEN F. JENKS

"It was a frontier-conquering era, in an intellectual as well as in a geographical sense; and sufficient technical skill, knowledge, and experience were rare and highly valued. It was natural, therefore, that so many of the engineering schools that sprang up in the middle half of the last century should have been called schools of technology or polytechnic institutes, and that their major objective should have been to teach the technique of engineering.

"Someone has defined engineering as the art of mobilizing materials, money and men for the realization of projects beneficial to mankind. It contemplates activity in three fields, not one. The engineer has to deal with the economic aspects of every problem he tackles. And always he has to deal with men.

"It is something like forty years since Frederick Winslow Taylor and Thomas L. Gantt, both Stevens graduates, laid the foundations of scientific management. Much water has gone over the dam since the publication of Taylor's paper on 'Shop Management,' and directly or indirectly, Taylor and Gantt and the Gilbreths and a host of others, largely engineers, have revolutionized the management of industry throughout two continents.

"This field of management has long since become one of great importance both in the curricula of engineering schools and in the activities of their graduates," continued Doctor Davis. "Obviously, a young man who is preparing himself for a career in any branch of management must greatly supplement his purely technical training. He must learn far more, both in college and through experience, than merely how to deal with inanimate objects.

Employer-Employee Relations

"Especially is this true in the crucial field of employer-employee relations. Much has been done in the last fifty years in this field of labor relations, a surprisingly large part of it by men with engineering training. I believe that it is in this field of employer-employee relations that the most significant and far-reaching progress in business and industry is going to be made in the next twenty-five years, that engineering trained men will be responsible for a considerable part of this progress, and that we of the engineering colleges must pay much more attention to this aspect.

Management vs. Administration

"Some five years ago James D. Mooney, president of the General Motors Export Corp., presented before a management session of the A.S.M.E. an extremely significant paper in which he suggested a sharp differentiation in the use of the words 'management' and 'administration.'

" 'Management,' he says, 'is concerned with the sphere of action, with the day-to-day decisions related to carrying out the (general) policies (of an industrial enterprise), with securing the best results for the industrial effort under such conditions as impose themselves upon it from month to month, with making a monthly profit, or, under extremely adverse conditions, stopping the loss at a minimum, and finally with just decisions of the day's problems relating to the equities of clients, stockholders, and employees.'

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" 'In short,' to quote again, 'administration is concerned with the strategy of the industrial operation; management, with the tactics. . . . It has been made plain to us by the depression that we are good production managers, but that we have not succeeded too well as administrators of industry.'

"Here lies," said Doctor Davis, "the most significant of all of today's challenges to the engineer and to the schools of engineering. It is to industrial administrators with vision and understanding, sensitive to the current major trends, economic, political and social alike, and yet steadfast in their faith in the ultimate dependability of human nature and in the ultimate value of enlightened individual initiative, rather than to politicians, that we must look for gradually evolved solutions of

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Above: The Banquet of the American Society

Below: Dinner of the American Institute

for Metals drew a large attendance.

of Mining and Metallurgical Engineers.

BIGGER and better than ever. The 19th Metal Exposition held in the Atlantic City Dominating the scene were the displays of the steel companies, with the alloy progress in metals and fabrication methods. Particularly in the field of welding and demonstrations carri

the major problems of today and tomorrow.

"I like to think that just as the engineer-technicians of a century ago have developed into engineer managers of unsurpassed skill today, so they in turn may develop into the engineer-administrators of tomorrow, able, as Mr. Mooney suggests, 'to philosophize about the general scheme of things,' and to feel 'the changes of the industrial tides' to which from time to time they have to adjust each his own industrial activity. Here is the real place of the engineer in modern life."

A.W.S. Elects Officers

Suceeding A. E. Gibson as president of the American Welding Society is Philip George Lang, Jr., of Baltimore, engineer of bridges of the Baltimore & Ohio Railroad. A native of Philadelphia, Mr. Lang received his bachelor and masters degrees in civil engineering from the University of Pennsylvania. He was formerly with the American Bridge Co. and the South & Western Railroad. He is president of the Engineers' Club of Baltimore and is active in the American Society of Civil Engineers, as well as many railroad associations.

Elected as senior vice-president is Col. Glen F. Jenks, chief of technical staff, Office of Chief of Ordnance, U. S. Army, Washington, D. C. Colonel Jenks received his B.S. from Hamilton College in 1901 and his M.S. in 1904 from the same institution. He graduated from the Army War College in 1924 and Harvard Business School in 1930. Entering the Army in 1901, he served during the war as Colonel, National Army, at Headquarters A.E.F. and at Headquarters Service of Supplies in charge of technical work in heavy artillery in the Office of the Chief Ordnance Officer. Since the war, Colonel Jenks has served in the same office in charge of engineering and production of artillery materiel, and later in the 8th Corps Area as chief ordnance officer. He was stationed at Watertown Arsenal as director of research for two years and then in command from 1932 to 1937, when assigned to his present position. He is a member of many technical societies and is chairman of the Industrial Research Division of the Engineering Foundation Welding Research Committee.

City Auditorium had 235 exhibitors who occupied 165,000 sq. ft. of floor space. alloy and fabricating technique exhibits chiming in with the main theme of and cutting, heat treating, plating and cleaning were actual full-scale working carried out.

C. A. McCune, of the Magnaflux Corp., New York, is the new treasurer. M. M. Kelly remains as secretary.

Two divisional vice-presidents were also elected: W. J. Sannemann, Tennessee Coal, Iron & Railroad Co., Birmingham, for the Southern division, and K. V. King, Standard Oil Co., San Francisco, for the Pacific Coast.

H. Sidney Smith, consulting engineer of the Union Carbide Co., New York, was awarded the Samuel Wylie Miller Memorial Medal "for meritorious achievement contributing conspicuously to the advancement of the art of welding and cutting." A director of the society and member of its executive committee, Mr. Smith is an authority on the oxy-acetylene industry. He is a native of Newark, England, and a graduate of Nottingham University. He practiced his profession in England until 1911, when he came to America as works manager in charge of all gas plants of the Prest-O-Lite Co., Inc., Indianapolis. He is a past president of the British Acetylene Association, the International Acetylene Association, and the Compressed Gas Manufacturers Association.

Lincoln Medal Awarded

The first Lincoln Gold Medal was presented to T. M. Jackson, chief electrical and welding engineer, Sun Shipbuilding & Dry Dock Co., Chester, Pa., for his paper, "Welding in Building Tanker Vessels," presented at one of the sessions of the American Welding Society. The medal was awarded for the best paper on welding published in the Journal of the society during the year ended with the annual meeting. Mr. Jackson's paper appeared in the October Journal and is abstracted in brief in later pages of this issue. His paper deals with the use of electric welding in the construction of tank vessels. Mr. Jackson has been with the Sun Shipbuilding company for 19 years. He is a graduate of Cornell University, and is chairman of the Philadelphia section of the A.W.S. Colonel Jenks, as chairman of the award committee, made the presentation. In accepting the medal, Mr. Jackson acknowledged the assistance of John W. Hudson, naval architect of the Sun company, since much of the material had appeared in a joint paper presented before the Society of Naval Architects and Marine Engineers last summer.

WELCOME A.S.M.

We're Not There

Were You There?
ATLANTIC CITY

Iron-Cobalt-Tungsten Alloys

Edward De Mille Campbell
*Memorial Lecture**

o o o

THE alloys under consideration in this lecture lie in the iron-rich portion of the ternary composition triangle and may be considered as iron-tungsten alloys in which a part of the iron is replaced by cobalt. A brief review of the structures and hardening characteristics in this portion of the iron-tungsten system may be of value as an introduction to the ternary alloys.

By the addition of tungsten to iron the A_4 point is lowered and the A_3 raised, resulting in restriction of the gamma field. If the tungsten content exceeds some 6 per cent, only the alpha form of iron appears at any temperature below the freezing point. Alpha iron can hold in solid solution about 30 per cent of tungsten at 1500 deg. C., but at 600 deg. C. the solid solubility drops to 6 per cent.

The hardening which results from quenching pure iron from a temperature within or above the gamma range follows a simple curve. Tungsten in amounts up to 4.5 per cent accentuates this hardening action, which, however, vanishes quite abruptly as the tungsten content exceeds 6 per cent, at which point the two hardness curves merge. As will be shown presently, this phenomenon bears directly upon the hardening characteristics of the ternary alloys and, hence, warrants here a limited survey of the attendant microstructures. When drastically quenched from or through the gamma range, pure iron is characterized by relatively small grains with serrated boundaries. This is obviously the mark of arrested grain growth in the freshly formed alpha iron and offers striking contrast to the large grain of regular outline which results from cooling at a moderate rate through the same temperature range.

This serrated form of grain is observed in alloys containing up to 4.5 per cent tungsten, after quenching from a temperature within the gamma range or above the alpha-gamma range.

The presence of some 5 per cent tungsten is necessary to prevent a partial or entire lattice rearrangement in the high temperature alpha solid solution during cooling through the gamma range, even though the cooling rate be extremely high. An alloy of 3.5 per cent tungsten, when quenched from 1400 deg. C., will apparently have undergone the double transformation throughout, but by heating for a few hours at a temperature within the alpha-gamma field, it may be observed from an examination of the resulting microstructure that the two solid solutions may be segregated. After quenching from such a treatment, the two solid solutions existing before the quench may be readily distinguished in the microstructure. The lighter alpha phase of tungsten content has remained unchanged during the quench, and the areas representing the gamma solid solution have of course transformed to alpha in cooling to room temperature. In this one particular instance, the overall tungsten content of 3.5 per cent was not sufficient to stabilize the high temperature alpha phase. By the segregating treatment, however, the tungsten was allowed to distribute itself between the two solid solutions, and the alpha phase, richer in tungsten, was uneffected by the quench. Herein appears to lie the explanation for the sudden disappearance of the quench hardening effect as the tungsten content rises above 5 per cent in the binary iron tungsten alloys.

When the coarse grained solid solutions containing more than 6 per cent tungsten are quenched from the alpha range and reheated at 550 deg. C., measurable precipitation hardening is observed after about 50 hr. At 600 deg. C. the hardening occurs more rapidly, and at 700 deg. C. the maximum hardness is attained at the end of 50 hr., as may be seen from the time hardness curves here shown. Hardened in this manner, such iron-tungsten alloys will obviously resist softening at temperatures of 600 or 700 deg. C., but are deficient in strength because of their large grain size.

Effect of Cobalt

By substituting cobalt for a part of the iron in these alloys, the solid solution is altered so as to become susceptible to grain refinement by rapid cooling from a temperature within the gamma range. Precipitation hardening may be induced within the fine grained alpha by a subsequent treatment, and the resulting alloy then combines the desirable high temperature hardness with the improved strength

*Abstract of a paper presented before the American Society for Metals, Atlantic City, N. J., Oct. 20.

(Structure and Hardening Characteristics)

By W. P. SYKES
General Electric Co.

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conferred by a small grain size of the alpha solid solution.

To illustrate the most obvious effects of cobalt substitutions, consider as a base an alloy of 80 per cent iron and 20 per cent tungsten. Reasons for this selection will presently become apparent. Two distinct changes in the hardness characteristics are immediately observed as the cobalt substitutions progress. The first of these changes appears in the abrupt rise in hardness as the cobalt content increases from 10 to 15 per cent. A lower curve, representing the hardness as quenched, and an upper curve showing the maximum hardness attained by subsequent aging at an optimum temperature, both rise abruptly within this narrow range of cobalt content.

Equally surprising is the second effect which appears in the greatly increased rate of age-hardening at 600 deg. C. over that of the binary iron-tungsten alloy of equal tungsten concentration (see Fig. 1). When the cobalt content is increased to 30 per cent measurable age-hardening occurs at a temperature as low as 375 deg. C.

Less apparent than these two effects, but of equal significance, is a third change in the hardening characteristics imparted by the presence of cobalt. The 30 per cent cobalt alloy in order to attain its maximum hardness by aging at 600 deg. C. should previously have been cooled at a fairly rapid rate from about 1300 deg. C. to some temperature below 450 deg. C. Only under these conditions will the rapid hardening occur when the alloy is reheated at 600 deg. C.

Preliminary observations of these phenomena suggested the likelihood of reactions involving the lattice transformation of the gamma solid solution followed by the precipitation of a tungsten-rich phase. It should be recognized that this analysis is based upon our knowledge of austenite decomposition and the mechanism of hardening in steel.

The microstructure of the 30 per cent cobalt-iron alloy as quenched from the gamma state differs not at all from that found in pure iron after a similar treatment, although as a result of the cobalt substitu-

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A.S.M.'s diorama of a primitive iron smelter is given a critical examination by two experts: W. P. Sykes, Campbell memorial lecturer (right), and M.I.T.'s G. B. Waterhouse, newly-elected president of the A.S.M.

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tion the Brinell hardness in the quenched condition doubles, increasing from 70 to 140. A striking change in the quenched structure of the 30 per cent cobalt alloy is observed when as little as 10 per cent of the iron is replaced by tungsten. In this composition, a distinct Widmanstätten pattern appears, becoming more pronounced as the tungsten content approaches 20 per cent.

The replacing of iron with tungsten in the 30 per cent cobalt alloy has a definite effect on hardness, and the hardness after quenching from 1300 deg. C. attains a value of Rockwell C 37 as the tungsten content reaches 20 per cent.

Hardness at Elevated Temperatures

It has been seen that cobalt has a pronounced effect upon the hardness of iron-tungsten alloys, as determined at ordinary temperatures. It may, therefore, be fitting to mention here the results of a few hardness measurements made at 700 deg. and 800 deg. C. upon a series of 20 per cent tungsten alloys bearing cobalt in quantities ranging from 10 to 35 per cent. These tests were carried out at the Battelle Memorial Institute through the courtesy of Dr. Oscar E. Harder and his staff, following a procedure which has been described by Harder and Grove.

The alloys, previously treated to maximum hardness were held at the temperatures of test for 20 min. before the application of load. Perhaps the most striking feature of these data plotted in the slide is the uniform rise in hardness at 700 deg. C., which follows the increase in cobalt content up to 35 per cent. At 800 deg. C. the relationship is apparently less direct, although the trend is undoubtedly the same.

Conclusion

Perhaps the most fascinating aspect of the picture which has been sketched today is offered by the analogy existing between these carbon-free ternary alloys on the one hand and the plain carbon steels on the other. As a fitting foreword to a brief summary of the foregoing evidence, it may be interesting to quote from Dr. Albert Sauveur. In the latest edition of "The Metallography and Heat Treatment of Iron and Steel," Dr. Sauveur, discussing martensite and the hardening of steel, remarks: "In no other alloy does the solvent undergo an allotropic transformation in the quenching bath, a transformation which is accompanied by a great fall in solubility. In no other alloy is so excessive a degree of supersaturation created by quenching . . ."

"To express it differently, the urge to age on the part of an excessively supersaturated solid solution of carbon in alpha iron is so great that aging starts at once,

THE Renaissance Room of the Hotel Ambassador is jammed for the feature Sykes, is seated in the first row (front) alongside Edgar C. Bain, retiring house are W. P. Woodside, vice-

whereas in solid solution of nonferrous metals no such urge exists —hence time and even increased temperatures are required to cause precipitation."

Now, as has been seen in this lecture today, some of these statements apply equally well to the carbon-free ternary alloys of iron, cobalt and tungsten. The gamma solid solution undergoes an allotropic transformation at a relatively low temperature during the quench. The solid solubility of tungsten in the newly formed alpha phase falls to about one quarter of its value at 1400 deg. C. The microstructures resulting from gamma decomposition in the two alloys are remarkably similar. Precipitation of a carbide on the one hand and of a tungsten-rich compound on the other keeps pace with gamma-alpha transformation over limited ranges of decomposition temperatures. In the case of the steel this range extends down to 150 or 200 deg. C. In the other alloy precipitation begins to lag at 500 deg. C. and becomes infinitely slow at 300 deg. C. The behavior of both alloys when first quenched from the gamma range to room temperature and then reheated is represented by time-hardness curves almost identical in shape. But to react thus, the carbon-free alloy must be aged at 525 deg. to 600 deg. C., whereas the steel requires a temperature of but 75 deg. to 100 deg. C. This difference may resonably be considered to result directly from the slower diffusion rate of tungsten in the alpha solid solution. As freshly quenched, both alloys exhibit the slow etching reaction typical of "white martensite," while the rapid darkening of the alpha needles by the etchant after aging indicates the presence of a highly dispersed precipitate.

One obstacle might yet seem to stand in the way of completing the analogy, i e., the considerable difference between the hardness of the carbon steel and that of the carbon-free ternary alloy as quenched to 0 deg. C. from the gamma range. Consider this apparent discrepancy in greater detail. As drastically quenched from 1450 deg. C., a relatively pure iron shows a Brinell hardness of 70. In the ternary solid solution of cobalt and tungsten in iron after quenching from the same temperature, there may be found a greatly increased hardness of 300 Brinell. Why then should there be much surprise that even higher hardness is developed in the carbon steels by quenching from lower temperatures of the gamma range? Or that an additional hardness increase attends the conversion of retained austenite when the steel is subsequently further cooled to the temperature of liquid air? In this case both the smaller grain size of the gamma solid solution and the lower temperatures of its transformation might be expected to decrease the size of unit in the freshly formed alpha structure.

session of A.S.M.'s technical program. The author, General Electric's W. P. president, and G. B. Waterhouse, newly-elected president. Behind Mr. Waterpresident, and Bill Eisenman, secretary.

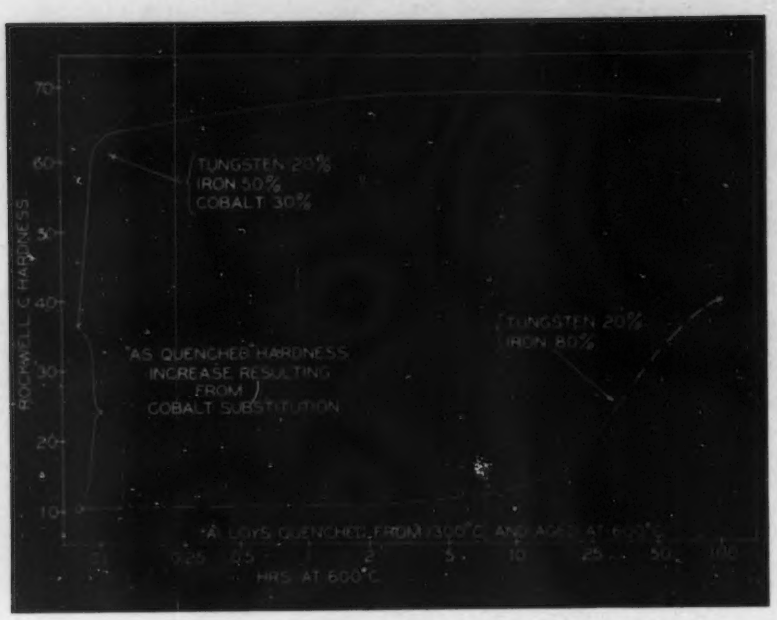

FIG. 1—The addition of cobalt to a tungsten-iron alloy increases the rate of precipitation hardening and maximum hardness enormously. This maximum hardness, C 67 Rockwell, is maintained at the relatively high temperature of 600 deg. to 700 deg. C.

Moreover, the mode of gamma transformation in the steel may differ from that existing in the ternary alloy and possibly contribute to a greater hardness. Nor should it be disregarded that the reasonable chance exists that alpha iron highly supersaturated with carbon may be much harder than the alpha solid solution of equal grain size in the ternary alloy.

An impressive demonstration of the close relation between hardness and particle size is furnished by some recent experiments of Dr. P. W. Bridgman and the author. Iron powders, hydrogen reduced from precipitated oxide were subjected to a pressure of 700,000 lb. per sq. in. The particle diameter of the coarser powder averaged 40 microns while that of the finer averaged 3 microns. The compressed pellets were tested for hardness by both Rockwell and microcharacter methods. Expressed in Brinell numbers, the hardness of the coarser metal measured about 200 while that of the finer approximated 400. When, therefore, the hardness of a metal may be increased from 70 to 400 Brinell by purely mechanical means, is it out of all reason to expect a still greater hardening to result from an atomic rearrangement such as accompanies the formation of alpha from gamma at temperatures below 100 deg. C.?

Consider the characteristic hardening curves of the two alloys which result from reheating after the quench. In the ternary alloy, this hardening accompanies precipitation of the tungsten rich phase within the fragmented alpha matrix at 600 deg. C. The carbon steel at 100 deg. C. arrives just as rapidly at the same ultimate hardness by a process which to all appearances is identical.

With due regard for our admittedly imperfect understanding of that property known as "hardness," this comparison seems to lead to the conclusion that precipitation of carbide is not essential to the hardness of a freshly quenched carbon steel. This statement may in turn be conditioned by the definition of the term "precipitation." With further refinements in terminology and experimental technique we shall doubtless approach more solid ground upon which to base future reasoning. In closing, may I again express my appreciation and the hope that today's discussion may have contributed in some little measure to our understanding of such hardening phenomena and encourage further effort in this field of investigation.

WHEN a lady is 2½ years old it is time to put away childish thoughts and delve into serious things, according to Nancy Jane Teeters, an interested visitor at the Metal Exposition. She's shown here checking the elongation of a tensile specimen, and later stated for publication, "It is most astonishing the high strength shown by some of the newer alloys."

Symposium on Carburizing

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HARKING back to the days when particular emphasis was placed on heat treating, the American Society for Metals at its annual meeting last week at Atlantic City devoted about half of its technical sessions to the important subject of carburizing. Practically all phases of the various carburizing procedures were considered in detail, the papers being about equally divided between theoretical investigations and practical information on modern production equipment.

The symposium was opened Thursday morning by heat-treating expert Marc Grossmann, of Carnegie-Illinois Steel Corp., who laid a foundation for all following papers by reviewing the fundamentals of the science. Mr. Grossmann stated first that the carburizing processes are generally classified under the headings (1) pack-carburizing, with solid carburizers, and (2) gas carburizing. These terms designate the *source* of the carbon whereby the steel is carburized.

Mr. Grossmann's review, however, dealt particularly with the mechanisms of carburization in these two processes. It might be thought that in the case of pack-carburizing, the steel would somehow be carburized directly by its contact with the solid carbon, but simple consideration shows that this is probably not the case. The carburizing compound is a fairly fine material, but even so it is not in complete contact with the steel (as for example a liquid would be). Therefore, according to the author, if the carburization took place by direct contact with carbon, it would be expected that the carburized case would be very high in carbon at numerous spots where the steel and the pieces of carbon were in actual contact, whereas the intervening regions would be much lower in carbon. It is known from experience that this does not happen; the carburized case is actually quite uniform. This indicates that the carburization takes place by another mechanism, and it is generally held that the solid carbon forms carbon monoxide (CO) gas, and that the CO gas is the agent that actually carburizes the steel. This hypothesis is supported, for example, by the types of experiment performed by Enos, who swept nitrogen gas through carburizing compound while the compound (with its steel) was at temperature, and so prevented the carburization which would otherwise have taken place. It seems clear from many experiments that pack-carburizing takes place through the formation of carbon monoxide (CO) gas which in turn reacts with the steel, although this does not exclude the possibility that carbon might carburize iron under proper conditions of intimate contact.

Both pack-carburizing and gas carburizing were therefore considered by Mr. Grossmann from the standpoint of the action of gases. In pack-carburizing the gas is CO, and in gas carburizing the agent may be any of a number of hydrocarbons (with which CO may also be present).

Pack-Carburizing

The process of pack-carburizing consists in placing a piece of low-carbon steel in a carburizing mixture or "compound," within a suitable carburizing box, and then heating the box and its contents for a suitable time at a selected temperature, one common practice being about 8 hr. at about 1700 deg. F. At the end of this time the carburizing process is complete. The carburizing mixture or com-

pound consists of carbon in some form, mixed with an "energizer." A common form of the carbon is charcoal. The energizer is an inorganic chemical compound, usually a carbonate, or an oxide, or a cyanide. Under these circumstances the following questions may come to mind:

What happens in the 8 hr. of carburizing?

What is the carbon distribution in the steel after carburizing, and how does it come to be so?

Why choose a temperature in the neighborhood of 1700 deg. F.?

What happens if charcoal (or other compound) is used alone without energizer?

What is the effect of the energizers and the mechanism whereby they act?

Does the steel change in any respect other than in its carbon content?

All of these questions were answered by Mr. Grossmann, after pointing out that the approach to these questions is simplified if the carburizing process is considered not as a single process but as a combination of two steps. The two steps are (a) carbon enrichment at the surface, and (b) diffusion from the surface into the interior. That is, (a) the steel *at its surface* reacts with the surrounding carburizing medium to form a surface material high in carbon, and (b) the carbon then diffuses from this surface layer into the steel.

The sole function of the carburizing medium is to provide a surface material high in carbon. During this carburization of the surface, other chemical elements may enter the steel, particularly oxygen.

Since carburization in pack-carburizing is considered to take place by a reaction involving CO, Mr. Grossmann considered it important to examine what material tends to form under these circumstances at the surface of the steel—what would be there if there were no diffusion of carbon away from the surface, in other words to examine the equilibria between steel and CO.

As a conclusion to his important paper, the author discussed depths of case in relation to surface carbon contents and rates of diffusion within the steel. Passing attention was also given to the behavior of other elements, namely oxygen, nitrogen and hydrogen, during carburizing.

M. A. GROSSMANN

Solid Carburizers

Following Mr. Grossmann's paper, H. W. McQuaid, of Republic Steel Corp., discussed solid carburizing agents in a theoretical manner, and Gordon Williams, of Cleveland Tractor Co., followed with an introductory paper on gas carburizing, which classified the various gases used according to the type of case and applications desired.

In his "Theoretical Discussion of the Action of Solid Carburizing Agents," Mr. McQuaid covered the part played by the charcoal and carbonate energizer in supplying a gaseous carburizing medium. He also suggested that the function of the carbonate energizer is to supply the carbon dioxide when needed, and that of the charcoal to convert it to carbon monoxide and also to prevent the accumulation of carbon dioxide on the surface of the steel. An additional suggestion was that charcoal removes the carbon dioxide not only by direct reaction but also by preferential adsorption.

Mr. Williams in his paper, "Gaseous Media for Carburizing," gave first a general survey of the literature on gas carburizing. Gas reactions within the carburizing chamber in contact with austenite were discussed and various simple gases considered. Carbon monoxide and many hydrocarbons were shown to be satisfactory carburizing agents fulfilling the fundamental requirements, i.e., ability to furnish atomic or nascent carbon to the steel surface up to the capacity of the surface to absorb it.

From the same viewpoint commercially available gases, and their special handling by dilution to reduce their activity, particularly their tendency toward soot precipitation were discussed.

G. T. WILLIAMS

In conclusion Mr. Williams showed that carburization to definite maximum carbon content may be performed by the use of dilute media of regulated carbon-supplying activity, or by permitting the hypereutectoid zone to be removed or decreased by diffusion.

Decarburization

Specialization in the carburizing symposium was initiated Thursday afternoon when General Motors' A. L. Boegehold and C. J. Tobin, in a paper entitled "Factors Governing Selection of Type of Carburized Case," discussed the way in which various types of stresses imposed upon automotive parts are taken into consideration in determining the kind of case required

to provide successful operation in service. These stresses, according to the authors, are the result of crushing loads, bending loads and of sliding, rolling and abrasion. The influence of the shape of the part and surface imperfections in producing stress concentrations were discussed in the paper with the aid of Woodvine's diagram.

The old bugaboo of decarburization then received attention in the hands of John A. Webber, of Interstate Drop Forge Co., who presented his views in a paper entitled "Furnace Atmospheres and Decarburization." Mr. Webber reviewed

A. L. BOEGEHOLD

first the troubles caused by decarburization in furnace atmospheres, then considered in detail the past investigations on the effect of the various gases present in the products of combustion of fuel-fired furnaces, and some of the methods being used to overcome decarburization. He also included many curves taken from the work of past investigators in order to have them available in one article for the convenience of the reader. The author also discussed and made some interpretations of the results of past investigations which he hoped will be helpful in clarifying a very broad subject.

Following Mr. Webber, a detailed discussion of steels for carburizing was presented by O. W. McMullan, of the Youngstown

C. J. TOBIN

Sheet & Tube Co., after which a hardenability test that grades steels of various compositions and grain sizes was described by W. E. Jominy and A. L. Boegehold, of the General Motors Corp.

In his paper entitled "Steels Used in the Carburizing Process," Mr. McMullan first stated that the reasons for which carburizing steels are used dictate their compositions. The first and most important requirement of a hard wear-resistant surface and tough core in a case hardened steel demands a low-carbon steel for carburizing. Higher carbon may be permissible or even desirable for some requirements. Processing operations and case characteristics limit the steels to plain carbon and moderately low alloy contents.

According to Mr. McMullan, the general requirements of carburizing steels are: (1) ability to absorb carbon at the usual carburizing temperatures at a reasonable rate, uniformly, and to a sufficiently high carbon content; (2) to harden satisfactorily in a quenching medium suitable for the article quenched and without undue distortion; (3) reasonable strength and toughness after carburizing and hardening; (4) satisfactory machineability for the machining process used.

The effect of composition of the steel and its relationship to design, size of parts, and proportion of case to core; the effect of quality of the steel, and the effect of grain size on the above four requirements were also discussed in detail. Medium-carbon steels for light case methods also were mentioned, and general properties of carbon and alloy compositions and their applications were included in the paper.

Production Carburizing

The first paper in the Friday morning session was a historical account of production carburizing by E. F. Davis, of Warner Gear Co. The initial part of Mr. Davis' paper was devoted to the antiquity of carburizing showing that cementation as exemplified in the Harveyizing process was an outgrowth of methods practiced by the ancients. Sustaining evidence from metallographic tests of Egyptian implements and reports of medieval practices by various writers were quoted to demonstrate that early workers in iron utilized this means of imparting carbon to steel, and furthermore it was in common use during the Middle Ages.

The less refined methods in vogue when the automobile industry was young were also cited. Mr. Davis' article then showed chronologically the gradual improvements in the practice which has affected the quality and costs of the process, such as the change from coal-fired to oil and gas-fired furnaces, the advent of the pyrometer, the elimination of manual control, the rise of scientific supervision, the development of carburizing compounds, the influence of the heat-resisting alloy, and the factors which brought about the mechanized furnace. The construction and operation of some of the modern installations were given in detail, and also included were items often ignored which affect carburizing costs.

The next paper in the symposium was entitled "A Study of Commercial Carburizing Containers," prepared by R. W. Roush and A. C. Dames, of the Timken-Detroit Axle Co. This paper described briefly the evolution of the carburizing container from the original heavy cast iron type to the modern individual unit type using thin sections of heat-resisting alloys designed to reduce the insulating effect of the

E. S. ROWLAND

compound to a minimum. This results in an important reduction of the time of heating and insures improved uniformity of temperature throughout the work. The various types of alloys used for carburizing containers were indicated and the factors which influence their service life were discussed. The importance of scientific container design was stressed, as well as the importance of factors commonly overlooked, such as furnace design, refractories and fuels.

Finally, the authors gave examples from practice, indicating what can be done in designing containers which conform closely to the work in compound carburizing. And, in conclusion, there was a brief discussion of retorts for gas carburizing furnaces as well as containers for liquid carburizing.

Solid Carburizers

The final paper of the Friday morning session was presented by S. L. Widrig, metallurgist for the Spicer Mfg. Corp., and was entitled "Physical and Chemical Characteristics of Carburizing Compounds and Their Handling in Production." First Mr. Widrig discussed the various types of solid carburizing compounds and the materials of which they are composed. The compounds consist of three principal constituents, namely charcoal, binder and energizer. In a good compound each constituent is carefully selected to serve their specific purpose in the most economical and efficient manner.

The importance of good adhesion of the energizing agent to the base charcoal was particularly stressed by Mr. Widrig. The proper proportion of energizer to charcoal must be maintained if good results are to be obtained.

It was pointed out that poorly designed conveying systems and excess screening or dusting result in high energizer loss. Energizer lost in handling must be replaced by additions of new compound in order to maintain a proper balance.

In closing, the author showed that parts to be box quenched are most economically carburized in certain types of compound which are slow burning when exposed to air at elevated temperatures.

The Friday afternoon final session of the carburizing symposium opened with a paper by L. D. Gable and E. S. Rowland, of Timken Roller Bearing Co., entitled "Commercial Gas Carburizing." In this treatment, the authors reviewed the development of gas carburizing from its beginning to the present

J. A. WEBBER

B. B. BECKWITH

day and discussed modern practice in this art. Commercial installations for gas carburizing were described in detail from the standpoint of the various gases used, and information was given regarding their operation. Variables affecting case depth and character of the case were discussed, and, finally, recommendations were made regarding commercial limitations in the control of these variables.

The following paper, presented by V. T. Malcolm, of the Chapman Valve Mfg. Co., also dealt with gas carburizing, with particular emphasis on light cases. Finally, the entire symposium on carburizing was closed by B. B. Beckwith, of the Chrysler Corp., with a paper entitled "Liquid Bath Carburizing." This paper considered in detail liquid bath carburization, its difficulties and some typical applications. The author first pointed out that liquid bath carburizing in the form of sodium cyanide for surface hardness has been used for a long time. It was then emphasized that activated cyanide baths, which increase the rate of penetration, have become popular. Mr. Beckwith also showed what depth of case can be expected at different temperatures and different times, and finally recorded the hardness obtained on four different scales of Rockwell tester on the same piece.

A.I.M.E. Reviews Steel Making

Control of slag and furnace conditions stressed in open-hearth session. Technical papers emphasize recent metallurgical advances

OUTSTANDING in the unusually interesting program of the fall meeting of the Institute of Metals and Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers, held last week in Atlantic City in conjunction with the National Metal Congress, was the exhibit at the institute's booth in the auditorium of the five recent metallurgical developments chosen by the Natural Resources Committee as being destined to play outstanding roles in the future development of America's economic and industrial life. The developments selected for the "honor roll" were the direct rolling of metals; the manufacture of aluminum coated steel; the electric welding of sheet metals by the Longoria method; metal spraying, and the production of manganese from low grade domestic ores.

The direct rolling of metals eliminates the ingot stage and all breakdown rolling of ingots as a preliminary to the rolling of sheets, and has attracted considerable attention because of its influence on the cost of producing sheets. In the direct rolling mills developed by Hazelett Metals, Inc., molten metal is fed continuously between two water cooled rolls which deliver finished sheets. Samples of sheets produced in this manner were on display and were keenly studied by visiting technicians.

Motion pictures showing actual views of the Hazelett mills received considerable attention from the 500 members and guests gathered at Atlantic City.

Giving steel the corrosion resistance of aluminum at a cost comparable to galvanized sheet is made possible by a process developed by Dr. Colin G. Fink of Columbia University, New York. This process, which makes it possible to coat steel sheets with a thin, uniform layer of aluminum, is being commercially developed by the Reynolds Metal Co., Knoxville, Tenn. In addition to possessing high corrosion resistance, steel coated with aluminum by Dr. Fink's process is said to also have notable resistance to oxidation at elevated temperatures.

The third contemporary invention listed on the "honor roll" was the Longoria welding process which makes it possible to weld steel and non-ferrous sheets at the rate of 30 to 60 ft. per min. This welding technique employs high frequency currents of one to two million cycles per second and fuses a very narrow band of metal, at the same time maintaining a very low temperature in the adjacent metal.

The fourth development singled out as of outstanding importance was metal spraying. Constant improvement in metal spraying technique and equipment, and its ever widening field of application has made a practical reality out of what was once considered a wild dream. In the United States two types of spraying guns are used; the wire-fed gun and the type utilizing metal powder. A third type is in use abroad in which small slugs of solid metal are melted in a reservoir and atomized as it flows from this chamber.

The fifth invention deemed worthy of a position on the "honor roll" was the method developed by the United States Bureau of Mines for producing manganese that promises to make available the metallic manganese present in low-grade domestic ores that heretofore have not been adaptable to commercial processes. Manganese used by the American steel industry comes almost entirely from foreign sources, and the success of this new process will not only make the steel industry independent of the political course of European politics, but it will also give the United States a controllable and sure supply of this important war material.

The method used by the Bureau of Mines dissolves the manganese in the ore and deposits it on 12 per cent chromium steel cathodes by electrolysis. It is then stripped from the cathodes and the resultant product is said to be 99.9 per cent pure.

The technical sessions of the meeting brought forth many thought provoking papers on a wide variety of subjects. Salient points of some of these papers follow.

That the intelligent application of recording and controlling instruments is a means of reducing errors attributable to the human

FIG. 2—Diffusion of carbon from steel into iron, at 125 diameters.

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factor and in this manner minimizing the irregularities of steel making operations, was the gist of a paper presented by P. F. Kinyoun, combustion engineer of the Lackawanna plant of the Bethlehem Steel Co., and presented at the open hearth steel practice session. Mr. Kinyoun's paper described the control features that have been built into the latest addition to the open hearth department of the Lackawanna plant. The six 150-ton furnaces which comprise the new addition, are heated with coke-oven gas, but provisions have been made to permit the use of fuel oil when the gas supply is low.

The controlling and recording instruments for the Lackawanna furnaces are mounted on a centrally located 7 x 10 ft. panel, and contain the following instruments: Flue recording potentiometer for measuring the temperature of flue gases; roof temperature control; regulator for controlling the fuel oil temperature; indicating gages for flue draft and furnace pressure; flow meters for steam, gas and fuel oil, and a furnace pressure regulator. In addition to the foregoing, one furnace is also equipped with an oil-air ratio regulator and a gas-air ratio regulator.

Furnace Roof Control

All the furnaces are equipped with roof-temperature control, consisting of a central recording potentiometer which continuously indicates and records the temperature at the center of the roof. Temperature readings are taken with a radiation type pyrometer installed permanently on the roof and sighted against a carborundum target brick inserted at this point. Fuel is automatically shut off when the roof temperature becomes excessive. When the temperature drops 20 deg., the fuel supply is automatically turned on.

Two hot-metal mixers, one of 450 tons, and the other of 1200 tons capacity serve the six furnaces. Should the power fail during pouring, the mixers are automatically returned at once to an upright position by compressed air which eliminates the danger of a spill of hot metal.

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Silicon Additions Improve Scaling Resistance

Data indicating that additions of silicon to chromium-molybdenum steels improve resistance to scal-

ing and increase room-temperature strength and hardness were contained in a paper read by H. D. Newell, chief metallurgist of Babcock & Wilcox Tube Co. The paper reviewed the work of certain investigators and gave an account of the effect of silicon in steels of the 2 per cent chromium, 0.50 per cent molybdenum type. This effect is illustrated graphically in Fig. 1.

Short-time tensile tests show that silicon stiffens the 2 per cent chromium-molybdenum alloy at 900 deg. F. but at higher temperatures the silicon has a softening effect. Ductility and impact, as the following table shows, tend to be reduced as the silicon content approaches 2 per cent.

Impact Value, One-inch Round Annealed
Charpy Foot-pounds

Heat No.	Silicon, Per Cent	Room Temperature, Deg. F.	Plus 25 Deg. F.	Minus 25 Deg. F.
2 Per Cent Chromium, 0.50 Per Cent Molybdenum Series				
849	0.20	61.0	60.0	54.0
898	0.55	39.0	39.5	30.0
900	1.03	44.0	41.5	39.0
899	1.22	42.0	44.0	39.0
910	1.93	33.0	36.0	8.0
911	2.96	2.0	3.5	1.0
5 Per Cent Chromium, 0.50 Per Cent Molybdenum Series				
873	1.48	10.0		
874	1.60	35.5		
Commercial	0.37	55.0		

*Average of three tests. Specimen 0.394 in. square, drilled notch.

Mr. Newell also commented on the fact that small amounts of copper improve the resistance of steel to dilute acid solutions and also its resistance to atmospheric corrosion. However, copper is nonresistant to sulphur compounds at elevated temperatures and for this reason is not used in steels for high temperature service.

Eric R. Jette, associate professor of metallurgy, School of Mines, Columbia University, New York, and A. G. H. Andersen of Phelps Dodge Corp., were authors of a paper entitled "X-ray Study of Effects of Adding Carbon, Nickel or Manganese to Some Ternary Iron - Chromium - Silicon Alloys." This paper covered an investigation to determine the effect of some of the commoner elements likely to occur in such alloys if made on a commercial scale. Their investigation was primarily concerned with the effect of adding carbon, nickel or manganese on the alpha-iron phase and the boundry between this phase region and the alpha plus sigma, two-phase region. The work was performed mainly by X-ray methods, but a number of microscopic examinations were also made.

ROLLAND C. ALLEN,
President, A.I.M.E.

The conclusions, with reference to nickel and manganese, that Mr. Jette and Mr. Andersen drew from their experiments was that the effect of these additions on the lattice parameters of both the alpha and sigma phases, in concentrations as high as 2 per cent nickel and 4.6 per cent manganese, was practically negligible and that the addition of nickel, or manganese to the alloys had no definite effect on the solubility of the alpha phase. Therefore, if it is desirable to add either nickel or manganese to the alloys covered by the investigation, to improve other properties, it may be safely done.

With reference to the effect of carbon additions to the alloys, the authors listed their findings as follows:

1. The solubility of carbon in the alpha phase is very low and probably in the vicinity of 0.02 to 0.04 per cent.

2. The effect of larger carbon contents is to diminish the lattice parameter of the alpha phase, the plot of α_o vs. per cent C showing a discontinuity between 0.35 and 0.5 per cent C, depending upon the gross alloy composition.

3. For carbon contents greater

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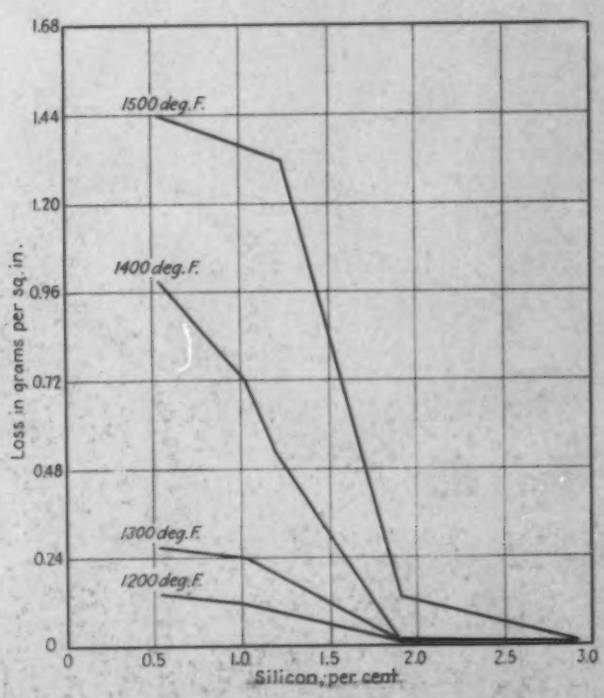

FIG. 1 — Effect of silicon on scaling resistance as indicated by oxidation tests of 100 hr. duration.

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than the point of discontinuity, the carbide phase has trigonal symmetry and is based on a compound of the formula Cr_7C_3.

4. The carbide contains some iron, but more chromium than iron is removed from the alpha base. At carbon contents higher than the break in the curve the composition of the alpha phase is independent of annealing temperature.

5. It is easily possible to change the composition of the alpha-phase matrix by the addition of carbon to the point where it will remain as alpha phase at all temperatures. The carbon content at which the precipitation of the sigma phase becomes impossible apparently coincides with the break in the curve.

6. The obvious manner to correct for the presence of carbon is to use 10 units by weight of additional chromium for each unit of carbon present.

7. No evidence of gamma-iron formation from either X-ray or microscopic examination has been found in the carbon containing alloys.

Carbon Diffusion

The increasing use of clad metals in industry has made it necessary to develop a closer understanding of the rate and circumstances of the direct diffusion of carbon from steel into iron. A comprehensive study of this problem was covered by the paper "Diffusion of Carbon from Steel into Iron," prepared by Leonard C. Grimshaw, superintendent, Duo Metals division, Latrobe Electric Steel Co., Latrobe, Pa.

As a means of studying this question, Mr. Grimshaw electroplated with iron various kinds of steel, ranging from low-alloy tool steels to high-speed steel, and the diffusion of carbon from the steels into the electrolytic iron at several temperatures was observed. By heating the diffused samples for three minutes at 1560 deg. F., quenching, polishing and etching in a cupric reagent, as recently suggested by J. H. Whiteley, it was easy to follow the diffusion. Fig. 2 is a photomicrograph showing the diffusion that took place in a steel with 1.13 per cent carbon, 0.35 per cent silicon, 0.26 per cent manganese and 0.08 per cent chromium after being held at 1900 deg. F. for ¾ hr., oil-quenched, then at 1560 deg. F. for 3 min. and oil-quenched again. The line in the illustration marked 0.0 indicates the original steel-iron interface; steel is below this line and the electrolytic iron is above. The extent of the diffusion is shown by the distances from the original interface marked in inches.

The rate of the diffusion increases with temperature, but this is not a function of temperature alone, as diffusion is most influenced by the phase of the steel and of the iron at any temperature. Diffusion is also influenced by the alloy content of the steel, Mr. Grimshaw said, both as it affects the phase of the steel at any temperature, and as it contributes to the formation in the steel of stable carbides.

The effect of tellurium on the mechanical properties of copper base alloys was discussed in a

paper presented at Thursday's morning session by H. L. Burghoff and D. E. Lawson, metallurgists of the Chase Brass & Copper Co., Inc. Although in the past the presence of tellurium in copper has been considered detrimental due to the fact that small amounts of tellurium produce red-shortness and render the metal worthless for hot-rolling, the authors discovered a few years ago that tellurium-bearing alloys could be machined more easily than alloys free of tellurium. This fact was studied further and substantial data were assembled which indicated that certain types of tellurium-bearing alloys possessed characteristics of commercial value.

Summing up the findings of the authors, the effect of added tellurium is greater in 1.5 per cent tin bronze than in commercial bronze or 3 per cent silicon bronze, as judged by the results of saw-cut tests on rods of these analyses. The relative machinability values for the tin bronze increase from about 40 per cent for tellurium-free metal to 125 per cent for 0.5 per cent tellurium content, and to about 140 per cent for metal with 0.95 per cent tellurium. Values for commercial bronze increase from approximately 28 per cent in the absence of tellurium to about 70 per cent for bronze with 1 per cent tellurium. The values for silicon bronze were raised from 40 per cent to 80 per cent when the tellurium was increased from 0.5 per cent to 0.7 per cent.

Diffusion of Solids

The vision of atoms playing the well-known childhood game of puss-in-the-corner was conjured up by the paper prepared by J. E. Dorn and O. E. Harder of Battelle Memorial Institute, on the subject "A Theory of Diffusion in Solids."

Metallurgists picture a solid metal as made up of row upon row of regularly spaced atoms. In most commercial metals these atoms are arranged as though they were stationed at the corners of tiny cubes which are otherwise empty. The theory of the movement, or diffusion, of these atoms from place to place in this atomic lattice was the substance of the paper when shorn of its technical aspect. Atoms occupying the established corners of this lattice are assumed to be continually oscillating about their corner stations. In one type of alloy, the "stranger" atom holds one of these corners. Occasionally two or more atoms exchange corners and the "stranger" atom, if it is one of the atoms making the change, moves on through the metal lattice. In another type of alloy, the "stranger" atom occupies the space in the center of the cube and, figuratively, waits for a chance to break through the restless eight atoms that surround it and to move on into the center of the next cube.

In their paper, Doctors Dorn and Harder gave the mathematical formula for calculating the chances of the occurrences of these moments favorable for the atoms to change corners, relating these moments to the melting points of the metals and to the known solubility of one metal in another.

The Iron Age's Representatives at the Nineteenth Annual Metal Congress

PRACTICALLY the entire staff of THE IRON AGE, with headquarters at the Claridge Hotel, attended the Annual Metal Congress last week at Atlantic City, N. J. Shown here are: (front row, left to right) Joseph S. Hildreth, vice-president of the Chilton Co.; C. S. Baur, general advertising manager; C. A. Musselman, president of Chilton Co.; Fritz J. Frank, executive vice-president: (second row, left to right) Emerson Findley, Cleveland representative; Peirce Lewis, Detroit representative; D. C. Warren, New England representative; B. H. Hayes, production manager; R. E. Baur, advertising art director; F. J. Oliver, associate editor, and J. A. Rowan, news editor of THE IRON AGE; and H. E. Leonard, New Jersey representative: (Rear row, left to right) W. B. Remington, advertising counselor; W. B. Robinson, Pittsburgh representative; B. L. Herman, Philadelphia representative; Oliver Johnson, research manager; C. E. Wright, managing editor, and J. H. Van Deventer, editor of THE IRON AGE; A. H. Dix, manager of reader service; H. K. Hottenstein, Chicago representative; C. H. Ober, New York representative; and W. F. Whalen, assistant in the Pittsburgh district.

Welding Meeting Papers

Comprehensive Program Includes Ship, Railroad Car, And Other Applications---Fundamental Researches Reported On

EIGHT technical sessions, at which 30 or more papers were presented and discussed, and one business session, made up the eighteenth annual meeting of the American Welding Society, held at Atlantic City, N. J., Oct. 18-22, during the National Metal Congress. Headquarters were at the Traymore Hotel, and the registration totalled more than 900. Election of officers resulted in the naming of P. G. Lang, Jr., engineer of bridges, Baltimore & Ohio Railroad, president, as reported elsewhere in this issue.

In addition to the meetings, a wide variety of welding and cutting apparatus and supplies was displayed at the National Metal Exposition, held at the Atlantic City Auditorium. One technical session was held jointly with the American Society of Mechanical Engineers.

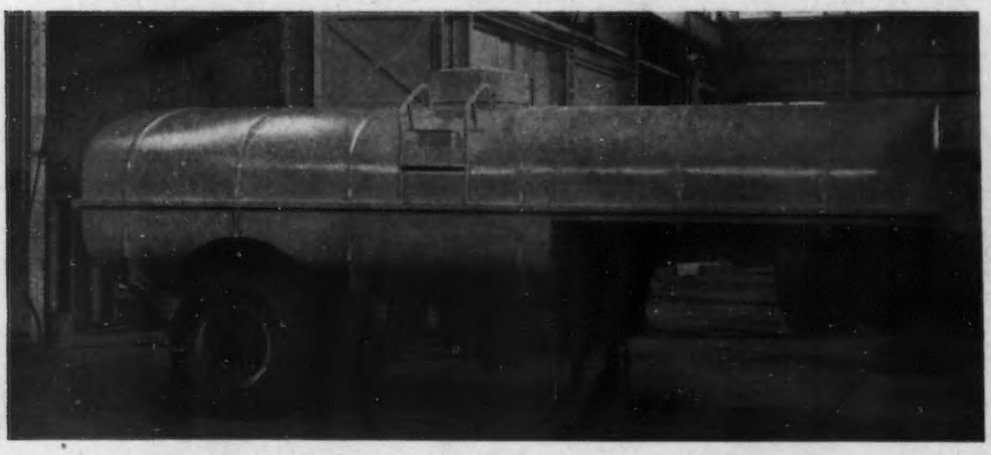
Research continues an outstanding activity of the welding society, and a full day and a half was devoted to the presentation of 10 or more reports of this work, which is being conducted by the welding research committee of the Engineering Foundation under the joint sponsorship of the American Welding Society and the American Institute of Electrical Engineers.

Welded Tankers

Applications of welding in the construction of tankers, barges and other ships were outlined by several speakers at a session devoted entirely to shipbuilding. In describing the welding of the midship portions of nine large oil tankers, T. M. Jackson, electrical engineer for the Sun Shipbuilding & Dry Dock Co., Chester, Pa., stated that welding has advanced to the point where it is now recognized by both ship-builders and ship owners as a means of saving weight and of securing greater simplification and economy. By the elimination of indirect connections, rivet heads, etc., the welded structure provides smooth surfaces which permit good drainage and easy cleaning and are subject to less surface corrosion. The possibilities are practically limitless, he said, and at present it is difficult to say how far they will lead in modifying present structural design.

Three of the ships described by Mr. Jackson are 542 ft. long and of 18,500 tons displacement, in which the entire cargo tank space extending from the engine room to the forward end of the tank space, a length of 353 ft. was of 100 per cent welded construction. As many parts of the vessel as possible are welded in automatic welding machines under the most favorable conditions. In this way, all the bulkheads are prefabricated before fitting them on the keel, which is laid in the usual ways.

The automatic welding process employed is the Unionmelt, in which the heat of welding is supplied by the electric resistance of a layer of fused mineral com-



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WELDED combination rail and truck milk tanks, built by the Struthers Well - Titusville Corp., Titusville, Pa., and described by J. C. Holmberg at the A. W. S. symposium on alloy steels.

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pounds. The process deposits an entire weld in a single layer and provides the solution of many problems of distortion. Butt welding is adopted for all the main structure. In welding the main units both automatic machine welding and manual arc welding are employed, the former only for shop assemblies. All welding on the shipways in connecting the assembled sections is also done by hand. The change-over from riveting to welding involved a somewhat different shop layout and different yard personnel.

Because of the severe punishment to which they are subjected, barges are usually the first type of vessel in which new developments in ship design and construction are given a trial, said George F. Wolfe of the Dravo Corp., Pittsburg, in a paper entitled "Assembly Plant for the Welding of Barges." If the new principle succeeds in the barge there is hope for it in larger vessels.

Adoption of the assembly line method was said to be one of the most far-reaching of the new developments in shipbuilding. This method with completely housed operation for barge building was evolved as the result of a study of production methods in other industries. As a result there is no congestion of equipment on the launching ways.

In brief, the method of building a welded barge consists of fabricating the elements of the barge in as large pieces as can be handled conveniently. The sides of the barge are box sections 30 ft. long, 10 ft. deep, 3 ft. wide, weighing 10 tons each. These are fitted to the bottom on a special fitting table which may be tilted to facilitate the welder's work.

Upon assembly of all side sections to the bottom, the barge, which, if it is of the coal hopper type, may be 175 ft. long, 26 ft. wide, and 11 ft. deep, is ready for launching. The entire barge is placed on a massive transfer carriage equipped with four 14-ton hydraulic jacks which carries it to the launching ways.

The design and welding of the first all-welded steel tanker, the motorship Transoil, 258 ft. long, of 20,000-barrels capacity, was described by A. C. Leigh, Ingalls Iron Works Co. at the same session. The economies of welding depend largely on the design, he said, and the designer should arrange that as much of the ship as possible, such as bulkheads, may be welded in the fabricating shop, where automatic welding is done under controlled conditions. It is in the assembly of the prefabricated sections into the completed ship with shell plating that the shipbuilder's skill is called for. The method of assembly advocated by Mr. Leigh is similar to that now employed in the erection of cantilever bridges, namely the erection of the various portions of the plating and framing by progressive steps.

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AN 18,500 ton welded tanker in process of construction at the yards of the Sun Shipbuilding & Dry Dock Co., Chester, Pa. In building the main units both automatic machine welding and manual arc welding are employed.

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Tests of Welded Construction Appraised

An interesting appraisal of the different phases of testing as applied to welded construction was given by Lieutenant Commander W. P. Roop, United States Navy, in a paper on "Tests and Arc Welding in Ship Structure." The paper covers tests of material (including electrodes, welding machinery and equipment and base metal), of welders, welding techniques, joints designs, and of completed structures.

In discussing tests of material, Commander Roop pointed out that it should never be forgotten that the ultimate object is not just to keep hardness down, not even just

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LAUNCHING a welded coal barge at the yards of the Dravo Corp., Pittsburgh. This sidewise launching, which is standard practice at the company's yards, provides an excellent test of the welding.

to find a weldable base, but to produce satisfactory welded structures. It has become a truism, he said in another part, that weld value depends on personal qualities in the welder. A personal qualification test is easily devised, but demonstrates only that a man *can* make a satisfactory weld, not that he *does* do so. Wherever possible the drift of practice is away from dependence on personal integrity and skill of the individual welder and toward fuller control of process and technique. As to what under given circumstances is the best technique, Commander Roop pointed out that no subject in welding is subject to wider differences of opinion. This demonstrates, he said, that tests of welding technique are not conclusive. The direct test doesn't work well partly for the reason that equally good welds can be produced by different techniques, and partly because no convenient method exists for defining techniques actually used.

In discussing tests of joints, he pointed out that what we want is a joint that will behave in service as if there were no joint. The tests made to determine whether the welded joint will possess this quality are of two kinds: (1) the direct test in which the conditions of service must be accurately known; (2) the indirect test in which test-conditions should duplicate service-conditions as closely as possible.

Symposium on Alloy Steels

A symposium on alloy steels was another feature of the same day's sessions.

That the welding of low-alloy steels is today an accepted practice was emphasized by Dr. A. B. Kinzel, chief metallurgist, Union Carbide & Carbon Research Laboratories, in an address on "Welding Low-Alloy Steels." The general solution of the problem of welding such steels was said to be to apply intelligent welding practice and follow the same principles as in the welding of carbon steel. Apply similar standards and tests as a measure of the results. Welding of low-alloy steels is a very small step beyond the welding of plain carbon steels, he pointed out.

Any of the wide variety of low-alloy steels available today is suitable for welded construction. Those containing less than 0.15 per cent carbon and having an ultimate strength below 80,000 lb. per sq. in. are classed by Dr. Kinzel as foolproof, providing the thickness is not excessive. Steels containing a higher carbon content and an ultimate strength not exceeding 95,000 lb. per sq. in. may likewise be used with complete satisfaction if the welds are relieved of shrinkage stress by suitable heat treatment.

W. SPRARAGEN,
Technical Secretary,
American Welding Society

In a paper on the "Spot Welding of Low-Alloy Steels," G. S. Mikhalapov, welding engineer, Heintz Mfg. Co., pointed out that the rules for good welding of low-alloy steels are in no way different from those for mild carbon steel. But alloy steels by virtue of their comparatively high electrical resistance and low thermal conductivity are much more sensitive and require a much stricter adherence to the rules if satisfactory results are to be obtained. The complete paper includes a review of the principles and technique essential for successful spot welding, and an interesting analysis of what happens when these are disregarded in welding low-alloy steels.

Unusual Welded Stainless Steel Equipment

A number of interesting examples of unusual pieces of welded stainless steel equipment were described at the same session by J. C. Holmberg, chief metallurgist, Struthers Wells-Titusville Corp. in an address on "Stainless as Applied to Pressure Vessels."

One of the most outstanding is a combination rail and truck milk tank [shown in one of the illustrations with this report]. The interior is of stainless steel, which is covered first with cork board insulation and then with sheets of mild steel. The interior has a "sanitary polished finish," to secure which all seams had to be flat, with no depressions that would not polish clear and clean.

Another interesting example of welded stainless steel apparatus was a vulcanizer used by a motor car manufacturer for the treatment of steering wheels. It was constructed of ½-in. thick 18-8 chrome nickel alloy and is 50 in. in diameter by 18 ft. long. It cost $10,000, whereas the same apparatus made of mild steel would have cost only $2,000. Use of the stainless steel was justified, however, by the fact that particles of rust would drop off the mild steel and spot the steering wheels.

Outstanding also, and featuring an unusual use of welded stainless steel was an X-ray machine for the treatment of cancer. Stainless was selected due to its greater density, which is important because of the tremendous vacuum necessary for successful operation.

In describing vessels constructed of 10 per cent nickel-clad steel, Mr. Holmberg said that no materials have received so great an acceptance as the nickel-clad steels had where caustic service is to be endured. The nickel surface is more corrosion resistant in this particular than any of the common alloys and the steel backing provides strength and reduces markedly the ultimate cost. The welding of this material has been until rather recently the greatest drawback to more widespread acceptance, he said. The welds must have the strength of steel on the outside and the comparative purity of nickel on the inside. To obtain this, the company assembles and tacks the various component sections together from the outer side, then welds the nickel side, using a pure nickel electrode. After completion of the nickel weld, the tacks are chipped out and the welding completed from the steel side. This procedure was said to be successful in producing joints having an iron dilution under 5 per cent.

How welding enables Army engineers who are building a 100,000,000 cu. yd. earth-fill dam across the Missouri River at Fort Peck, Mont., to keep a vast array

of heavy equipment in operation despite breakdowns and wear from handling highly abrasive material was told by T. B. Jefferson, engineer in charge of shops, U. S. Engineer Department, at a session devoted to fabrication.

On this huge and isolated project, far from sources of supplies and repairs, welding was adopted as a means of maintenance and at the peak of construction more than 123 men were employed as welders.

The greatest number of problems arose in the maintenance of dredges with their pumps, cutters and impellers, and steam shovels, tractors and similar machinery. That part of the equipment which has been worn away is replaced by an application of a wear-resistant surfacing material. For the repair of worn dredge pump casings, the casing is heated to 800 deg. F. before the welding torch or arc is applied. The welder then builds up the worn area or repairs the cracks while the pump is hot. Although the work is severe, the results were said to be excellent. Some of these pump casings have been repaired by the application of weld metal and hard facing as many as seven times without any loss in pumping efficiency as compared with a new pump. Another place where welding played an important part is in the construction of the core wall of the Dam. About 50,000 lineal ft. of welding was done on sheet piling ⅝ in. thick.

Wrinkle Bending of Pipe Line Pipe

The "wrinkle bending" method of shaping natural gas pipe lines to follow the contour of mountains and gulleys which they cross was described by R. B. Aitchison, Linde Air Products Co., at the same session. The method replaces the "cold bending" used hitherto.

To wrinkle bend a pipe, an oxy-acetylene torch is used to heat a narrow band at right angles to the pipe and extending half way around the pipe. The pipe is then bent either by hand or by means of a tractor. The heated section is thus slightly buckled, and the bend smooth and sweeping. For bends of greater curvature two or more wrinkles are made. The wrinkles project outwards, providing a full opening throughout the bend. A wrinkle may be made in 2½ to 3 min.

WARNER S. HAYS
Managing Director,
American Welding Society

Wrinkle bending was said to lend itself readily to correction, since too much bending in one or more wrinkles may be taken out simply by reheating and reversing the pull or sag. The pipe is not stressed as in cold bending because the bend occurs only where the pipe has been softened by heating. An important advantage stressed for wrinkle bending is its low cost.

Automatic Resistance Welding

Automatic features of five common types of resistance welding were outlined by Harry Landstrom, Nash-Kelvinator Corp. Examples of what the development of automatic welding has done in one industry were also cited.

Rims, at one time, were butt welded, using two men to a welder and the work was clamped manually, the flashing and the push-up were controlled likewise. Production was at the rate of 1300 rims for 9 hr. for the two men. With the first fully-automatic welder using air-operated clamping and hydraulic push-up, one man produced some 3100 rims per 9 hr. Further improvements since that time have resulted in greatly exceeding even the latter speed. Spot welders were made to operate at a speed of 75 to 90 spots per min., but by means of automatic controls the speed has been increased to more than 200 spots per min. Seam welders did very well to produce some 3 or 4 ft. per min.; today on the same machines with modern controls, production is at the rate of 8 to 10 ft. per min.

In seam welding the art of automatic welding was said to have reached its greatest height. A good seam welder with the best of welding transformers can be ruined by the use of poor seam welder spindles and rolls. Again, it may be necessary to flood the work with water to prevent fusion of the rollers to the sheets instead of the sheets to each other. Fractions of a single cycle of welding current must often be controlled; for this purpose the most advanced types of electronic tubes are employed.

The automatic principle has also been applied to gun welders, or portable spot welders.

Welding Makes Progress in Railroad Field

Use of welding in the construction of railroad cars and of machine gas cutting in railroad maintenance and repair work were discussed at a railroad session, held the last day of the meeting.

The last 10 years have been ones of great progress in railway car design and welding has played an important part, said V. R. Willoughby, general mechanical engineer, American Car & Foundry Co., in a paper devoted to "Welding of Railroad Rolling Stock." Stating that up to 1927 the use of welding in new car equipment was, except in isolated cases, only incidental, he reviewed in part what has happened since in freight, tank and passenger car fields.

Modern passenger train design calls for a structure as well balanced as the old "one horse shay," he said. The entire structure, which in reality is in the form of a large tube, is the load carrying member. Designers have found that welding provides the best means for obtaining this balanced structure.

In another part Mr. Willoughby spoke of the 70-ton all welded hopper cars built by the Pullman Car & Mfg. Co. in 1931. The light weight of this car was 45,900 lb. Compared with 50,200 lb., the light weight of probably one of the lightest riveted designs of 70-ton cars, there is obtained a weight saving of 4300 lb. Inasmuch as the hopper car is usually loaded to its full rail capacity, this welded car can carry 164,100 lb. of pay load whereas the riveted car can carry only 159,800 lb. This means that for each trip the welded car can

(CONTINUED ON PAGE 86)

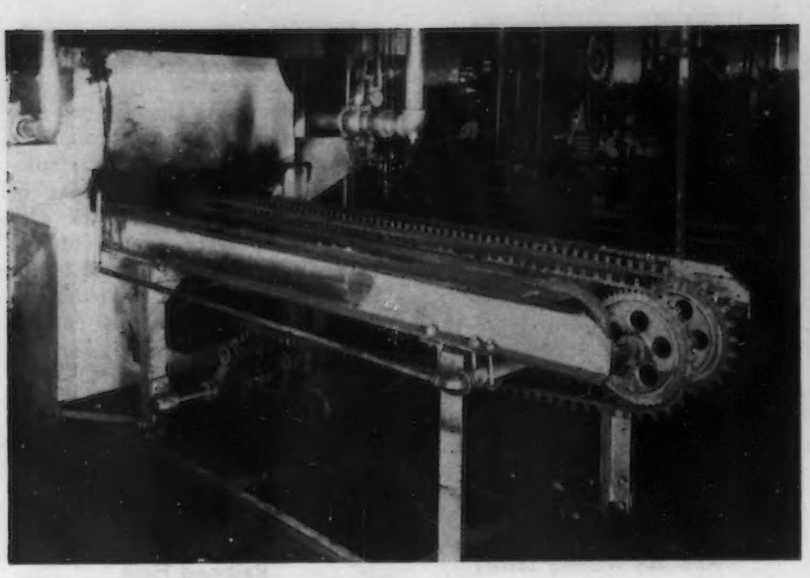

FIG. 1—Baldwin-Duckworth stainless steel annealing oven chain conveyor.

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FIG. 2—American Monorail transfer

A Portfolio of Heat Treatment

THE problems of handling materials or parts by means of mechanical equipment through processes requiring the use of high temperatures involve the consideration of one more factor in addition to the usual ones of time, quantity, distance, and coordination. This new factor is the effect of the heat on the mechanical handling equipment itself.

More and more as the continuous flow principle of handling grows in popularity, the handling equipment used in all kinds of heat treatment work is of the "through" variety; that is, mechanisms which take the materials or parts to be treated through the heat process continuously. For instance, sheets and strip metal both are now passed through continuous annealing furnaces; many kinds of ceramics are sent through tunnel kilns; glass in sheets and molded forms runs in continuous streams through finishing and tempering ovens; even the enameling and japanning of metal parts frequently is done in through baking ovens.

But even where the handling equipment takes the goods into and out of the heat treating processes with back and forth movements the consideration of the effect of the heat on the handling equipment is much the same, for that equipment takes the heat treatment itself, not once, like the material treated, but

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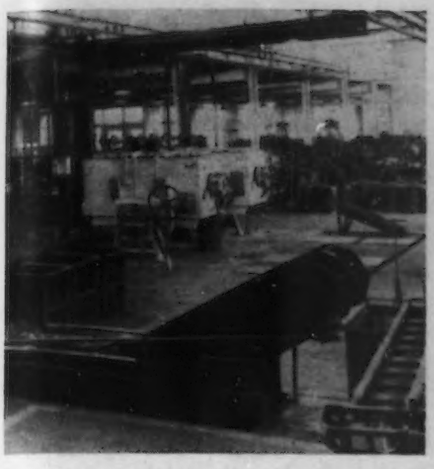
FIG. 4—Jeffrey roller chain with lugs carries sheets through annealing oven.



crane installation in heat treating room.

FIG. 3—Jeffrey overhead chain conveyor serving a metal enamelling department.

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Handling Methods

FRANCIS JURASCHEK
Consulting Editor, The Iron Age

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over and over again. Consequently two things need to be weighed in the consideration of such equipment as far as the effects of that repeated heating is concerned: The materials from which the equipment is constructed, and the lubrication of one moving part upon another.

With those two points in mind it can be readily seen that certain types of mechanical handling equipment are not at all suited for use in any process which calls for the use of high temperatures, or in connection therewith, of corrosive fumes. In general, the types that are suited to such service are usually some especially designed members of the conveyor family . . . especially designed in the sense that heat resistant materials of particular characteristics may be used, and bearings subjected directly to heat are constructed in such a way as to require the utmost minimum of lubrication.

At times it will be found that metal belt conveyors, or apron conveyors, will meet the need precisely; at other times it will be necessary to use conveyors in which raised lugs or arms support the materials passing through the treatment. But even these do not serve a universal purpose; consequently we find a host of special carriers suspended from overhead

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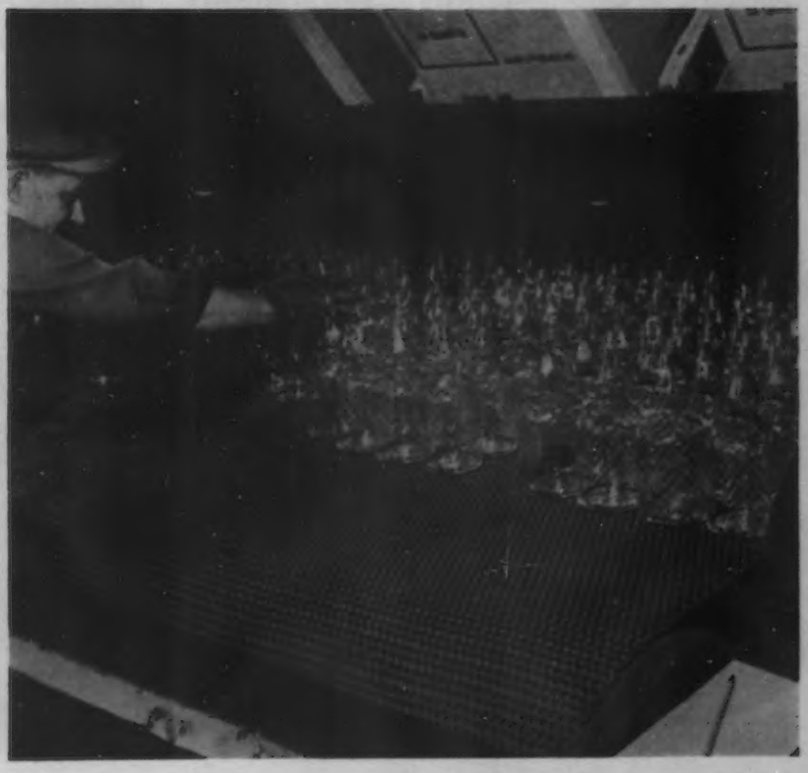

FIG. 5—Wickwire-Spencer wire-link metal belt carries glassware through tempering.

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AT LEFT

FIG. 6—Chain Belt conveyors in heat-treating department of a tractor plant.

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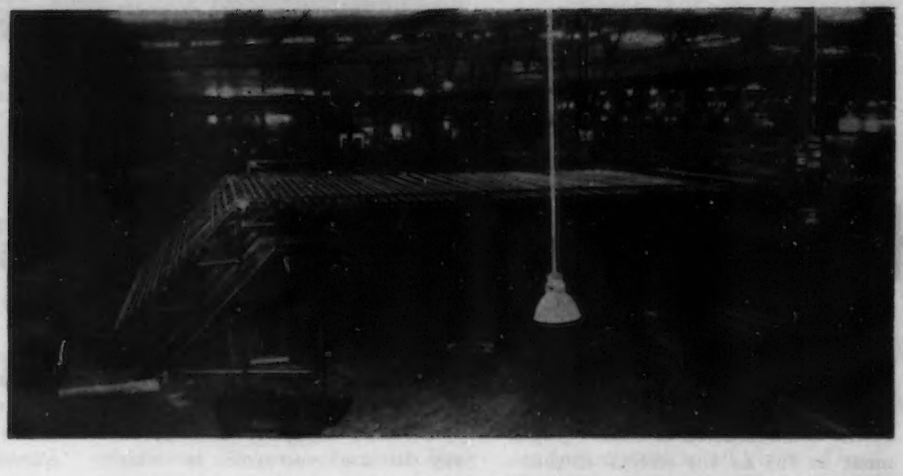
tracks, with the movement effected through various types of movable trolleys. The fifteen examples illustrated in this portfolio show many different kinds of conveyor equipment used in many different ways. A glance at each illustration will generally show the reason for the selection of the particular type of conveyor equipment used, and may suggest to the reader a possible adaptation to meet some need of his own.

Fig. 1 shows a continuous conveyor running through an annealing oven for the treatment of heavy steel parts. Two special Baldwin-Duckworth stainless steel



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AT RIGHT

FIG. 7—Chain Belt Co. tube-cooling conveyors take hot tubes directly from mill.

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chains are used, with raised lugs to support the steel parts. This chain is subjected to continual heating and cooling, the maximum oven temperature being 1600 deg. F. Each chain is carried by a pair of sprocket-wheels located *outside* the oven proper; the driving sprockets likewise being located outside the oven as shown in the photograph.

BELOW

FIG. 8—American Monorail installation permits handling between two rows of ovens.

In Fig. 2 an American Monorail transfer crane installation is shown in a very modern heat treating department of a large industrial plant. This crane is supported on monorail tracks running down the length of the room, and the small electric hoist it carries is so mounted that it can be run off the crane onto sections of transverse monorail track located over the batteries of furnaces.

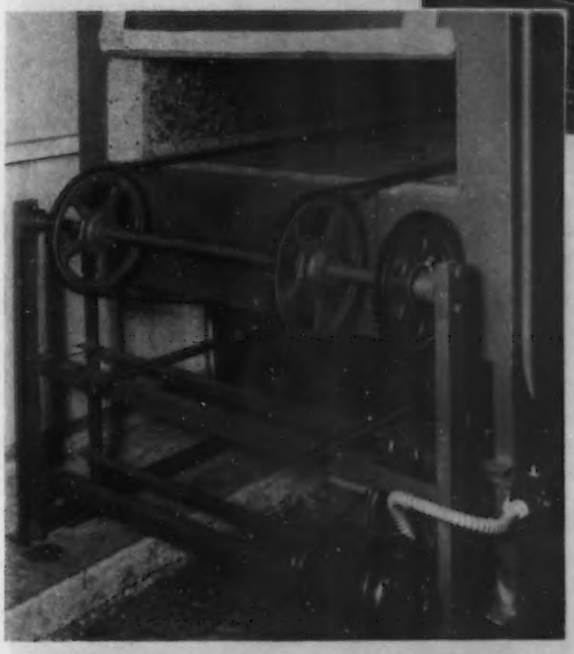
In Fig. 3 a Jeffrey overhead chain conveyor carries S-shaped wire hooks at regular intervals, on which may be suspended items of enameled ware passing through a baking oven. The movement of both chain conveyors shown is con-

tinuous, and many different types of wire carriers are used to augment the capacity of the conveyor.

Another type of annealing oven conveyor is shown in Fig. 4. Here Jeffrey roller chain equipped with long lugs picks up the sheets which are to be passed through the oven from an inclined table over which the sheets move on small side wheels, and hold them while passing through the oven on eight points per sheet, so that the minimum amount of sheet surface is in contact with the conveyor.

In Fig. 5 a special heat-resistant wire-link metal belt made by Wickwire-Spencer Steel Co. is carrying large glass bottles through a tempering oven. Metal belts, either woven or assembled from links and pins, are widely used where the temperatures do not run above 500-600 deg. F.

Fig. 6 illustrates a combination of conveyor equipment in a tractor plant, as installed by Chain Belt Co. In the foreground is a wooden slat conveyor, power driven, running from right to left. Leading from this is a double section of gravity rolls, taking parts to a furnace through which a metal slat



ABOVE

FIG. 9—Baldwin-Duckworth chain carrying woven wire belt from quenching baths.

o o o

AT LEFT

FIG. 10—Chain Belt conveyor to carry wide sheets through a heat-treating process.

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AT RIGHT

FIG. 11—American Monorail equipment carries trays of molded ceramics into ovens.

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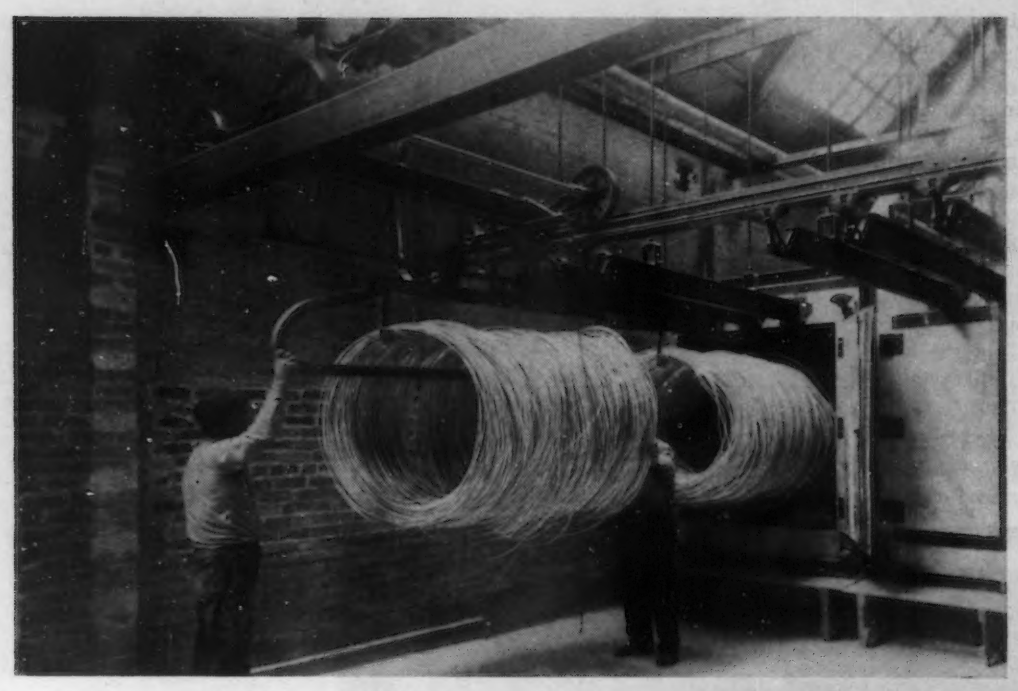

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AT LEFT

FIG. 12—Louden transfer crane carries coils of wire into ovens on hairpin hooks.

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conveyor runs continuously. The opening of a smaller furnace fed by a set of gravity rolls, may be seen at the far right of the illustration.

Fig. 7 is not an illustration of a piece of heat-treating apparatus, but it fits into the scheme nevertheless. It is a tube-*cooling* conveyor, taking the hot tubes directly from the mill and carrying them slowly across the shop in the open until they have cooled sufficiently to handle. This is Chain Belt Co. equipment.

Fig. 8 shows an American Mono-

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AT RIGHT

FIG. 13—Special quench basket carried to quench bath over Louden monorail track.

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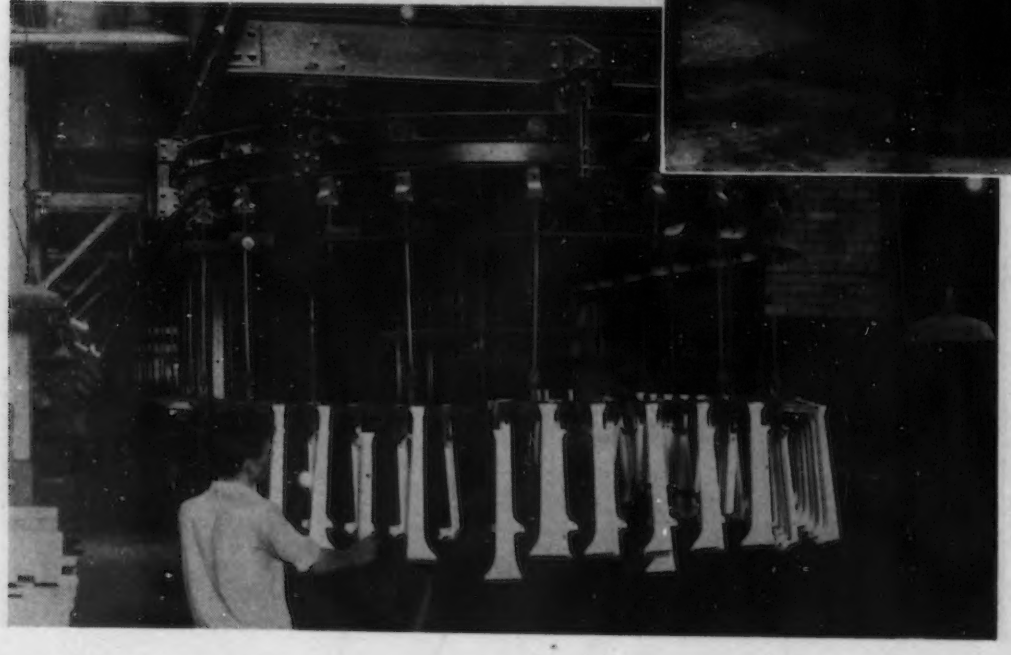

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AT LEFT

FIG. 14—Jeffrey continuous overhead conveyor carries parts through heat treatment.

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rail transfer crane permitting the handling of large carriers between two parallel lines of ovens, and interlocking to track sections for passage directly into the ovens. In other words, the carrier, with suspended parts for treatment, are brought to each oven on the crane, and then transferred over the interlocking monorail track, directly into the ovens.

Fig. 9 is a photograph taken in the modern heat-treating plant of Baldwin-Duckworth Chain Corp. and shows woven wire metal belt equipped with cross slats used to bring miscellaneous chain parts from the quenching bath after heat-treatment. Baldwin-Duckworth chain is used in this conveyor.

On the Chain Belt chain conveyor shown in Fig. 10 wide plates are carried through an annealing oven. In the oven the lines of chain slide over metal plates placed longitudinally. All chain sprocket wheels are mounted outside the oven proper, at each end thereof.

In Fig. 11 carriers loaded with molded shapes are being handled over American Monorail tracks directly into the ovens in a large ceramics plant. Double doors open to permit the carrier trolley to enter on the track, then are closed, with the heavy single oven doors, after the load is completely inside.

FIG. 15—American Monorail trolleys enable one man to push 17 doors into baking oven.

A hairpin hook carries coils of wire directly into an oven from the Louden transfer crane, over the interlocking track, so that handling of these unwieldy shapes into and out of the oven is greatly facilitated. See Fig. 12.

In Fig. 13 a special quench basket loaded with parts from a heat-treatment furnace is lowered by a Northern electric hoist running on Louden monorail track into the quenching bath.

Fig. 14 shows a Jeffrey continuous overhead tramrail conveyor carrying metal parts through a heat-treating furnace. The flow is uninterrupted.

American Monorail trolleys enable one man to put as many as 17 doors at once into the baking oven shown in Fig. 15. Note the arrangement of monorail tracks and switches overhead. Every foot of space can be utilized by planning the layout of such trackage carefully.

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THIS steam turbine cylinder base casting is one of the largest to be made at the Trafford Foundry of the Westinghouse Electric & Mfg. Co. It was moulded in dry sand in a pit 30 ft. long, 18 ft. wide and nine ft. deep and required 116,000 lb. of gray cast iron melted in a cupola. Pouring was accomplished with three ladles through 16 gates on the two lower flanges and through one in the center. The shipping weight of the trimmed casting is 88,700 lb.

o o o

Britain Peers into Garbage Pails To Get Scrap for Steel Industry

LONDON (*Special Correspondence*).—The British Iron and Steel Foundation has turned its searchlight on garbage collection in an effort to make available larger supplies of scrap for the British iron and steel industry.

It has circularized 150 towns and cities to discover what happens to thousands of tons of scrap metal thrown into garbage cans. Every year local municipalities collect over 10,500,000 long tons of household refuse, and of this 400,000 tons is ferrous metal.

Little Recovered

So far as is known, only about 50,000 tons of metal, 12.5 per cent, is being recovered annually, and the federation has started an inquiry to find out how much scrap metal is being wasted.

Some authorities use a complete salvage plant, which extracts metal, glass, paper and rags. Others separate metal only. The disposal of this to the contracting merchant insures that the steel works will get the benefit.

In three towns investigated by the federation, it has been ascertained that one saves 400 tons of scrap metal, one 1000 tons, and the third nothing.

Another factor increasing difficulty of obtaining adequate scrap supplies is the scarcity of old ships for breaking up. Fantastic prices being paid by foreign buyers for second-hand vessels for operation during the present high level of freight rates is believed to have reduced the amount of tonnage available to British shipbreakers by approximately 50 per cent.

In normal years British shipbreakers scrap some 400,000 tons of old shipping but this year they do not expect to scrap more than 200,000 tons. Prices have also risen sharply and today shipbreakers have to pay approximately 45 shillings ($11.25) per gross ton, compared with 30 shillings ($7.50) a little more than a year ago.

This level is just about remunerative in relation to the present price of steel scrap. However, the steel industry is so short of scrap that if the shipbreakers are forced into paying a still higher price for old tonnage the steelmakers have agreed to pay a premium over the current market price for scrap.

All the buying abroad is done through the Shipbreakers' Association, and then allocated to the various companies in the industry, although there is free competition for tonnage in the domestic market.

The most important overseas market at present is the United States, where shipowners are still unloading war-time tonnage at good prices. The Shipbreakers' Association recently secured 10 old American vessels of about 6000 tons each, although faced with keen competition from Japan.

Meanwhile, work is being continued in Britain upon the salvage of the sunken German Fleet at Scapa Flow, which is expected to provide work for at least another five years.

Nationalization Of Swedish Ore Urged

LONDON (*Special Correspondence*).—A bill authorizing an increase in the quantity of iron ore that may be mined may soon be introduced in the Swedish Chamber.

At present a Riksdag member who has raised the question of nationalization of Sweden's mines urges that growing demand abroad for the country's ore makes it desirable that the deposits should not remain in private hands.

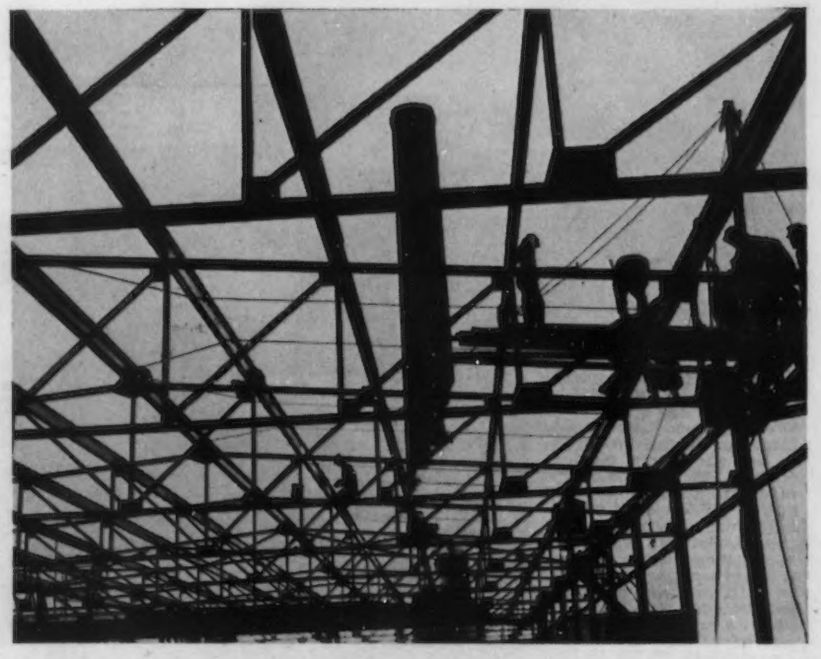
The mines mainly concerned in any increase allowed in the output are those in Lapland, belonging to the Luossavaara-Kiirunavaara Co., a subsidiary of the Grangesberg-Oxelosund Traffic Co.

One-half of the capital of the former enterprise is owned by the State and under the existing agreement the State has the right in 1947 or in any tenth year thereafter to redeem the other half from the holders, the Grangesberg company, at a price equal to 25 times the average profit for ten years on 4,250,000 tons of ore, plus the sum the State itself receives in royalty.

The Swedish Finance Minister, M. Wigforss, is opposed to the early consideration of the nationalization question.

Since the Swedish output is not keeping pace with demand, the Dunderland Iron Ore Co. has reopened its mine in the north of Norway. Operations were started in September after the mine had been closed for more than six years.

The company is entirely British owned and controls the second largest iron ore deposit in Norway, estimated at 200,000,000 tons. In view of the rising British demand for ore the decision is welcomed in the United Kingdom.



WEBS of steel against the sky help tell the story of factory expansion in the automotive industry. At the DeSoto division of the Chrysler Corp. a new third story is being added, a new battery of presses is being installed in the stamping division and chassis and final assembly lines are being lengthened to step up the production capacity of the plant.

Porcelain Enamelers Have Annual Meeting and Technical Forum

AT the Hotel Congress in Chicago, Oct. 11 and 12, executives from member-companies of the Porcelain Enamel Institute and others assembled for the institute's seventh annual meeting, heard outlined the most ambitious program ever attempted by the industry, according to the institute. This new program, effective Jan. 1, 1938, will be a continuation of that conducted for the last several years with expanded advertising, promotional and research activities. Prominent in the work will be a continued trade and technical trade paper advertising campaign, increased direct mail advertising, continuation of institute fellowships at Ohio State University and the National Bureau of Standards, and the publication of additional technical treatises. In addition increased emphasis will be placed on contact with present and prospective members of the institute.

Officers elected for the coming year at the annual meeting are: F. E. Hodek, Jr., General Porcelain Enameling & Mfg. Co., Chicago, president; H. D. Chase, Chicago Vitreous Enamel Product Co., Chicago, vice-president in charge of advertising and promotion; Richard H. Turk, Porcelain Enamel & Mfg. Co., Baltimore, vice-president in charge of research; William Hogenson, Chicago Vitreous Enamel Product Co., Chicago, who was reelected treasurer for the seventh time; and George P. MacKnight, managing director of the institute, who was reelected secretary.

At Ohio State University, Columbus, Ohio, Oct. 13 to 15, more than 230 executives and enamelers assembled for the second Porcelain Enamel Institute Forum. The Forum meetings henceforth will rotate between Ohio State University and the University of Illinois. While no definite date has been set for the third Forum, F. E. Hodek, Jr., chairman, has announced that it will be held some time during the fall of 1938.

As in the past, the first day of the institute's annual meeting was devoted to a sales conference of the industry. Presentations were made by each sectional chairman. The conference was opened by R. G. Calton, institute president for the last two and one-half years. Mr. Calton explained briefly what the institute had accomplished during the last year and introduced E. L. Lasier, of the Titanium Alloy Mfg. Co., who talked on "What the Educational Bureau Has Done in 1937."

One of the most significant facts brought out during the entire week of industry meetings was announced by Mr. Lasier. According to a chart which he explained to the institute membership, general business activity for the first three-quarters of 1937 has been 78 per cent, or an increase of 38.1 per cent over 1932, whereas the increase of the porcelain enameling industry's activity over 1932 has been estimated at 110 per cent. He further pointed out that the industry's sales for 1937, estimated on the first three-quarters' activity will amount to approximately $22,000,000. The sales of the industry for 1936 amounted to approximately $17,000,000. Mr. Lasier emphasized the fact that these figures are for the jobbing shop, sign, breakfast set and table top, and frit divisions of the industry only and do not include the sale of other porcelain enameled products nor of the cooperation division.

"Market Research and the Industry's Markets," was the subject presented by George S. Blome of the Baltimore Enamel & Novelty Co., chairman of the institute's market research section. Through the use of six charts Mr. Blome showed that the sales of various porcelain enameled products for 1936 and a given number of months for 1937 were as follows:

	1936	Eight Months, 1937
Household electric refrigerators	1,595,806 units	1,377,975 units
Washing machines	1,204,227 units	1,245,520 units
Ironers	125,548 units	128,589 units
Commercial electric refrigerators	$11,856,000	$15,200,000
Gas ranges	$67,110,000	$38,450,000 (6 mo.)
Electric ranges	202,987 units	284,043 units
Table tops and breakfast sets	$2,795,678	$1,980,592
Signs	$2,974,174	$2,059,980
Architectural porcelian enamel	$1,000,000 (estimated)	$1,500,000 (estimated on first three quarters activity)

"The How and Why of Technical Research," was the subject of Richard H. Turk's report, as chairman of the technical research section. Mr. Turk pointed out that his section, with the assistance of Professor King, technical director of the institute, had divided and concentrated its work under three main divisions: research, surveys and publications, and miscellaneous activities.

For 1938 the section's activities will be as follows: Conversion of the tentative acid resistance test to a standard test; development of an abrasion and acid resistance test in cooperation with the National Bureau of Standards fellowship; continuation of patching investigation fellowship at Ohio State University; publication of a booklet on Architectural Porcelain Enamel; further milling practice studies, and additional surveys.

Earle S. Smith, of the Toledo Porcelain Enamel Products Co., chairman of the industry, trade and consumer contact section, reported that a number of department store and trade show demonstrations had been conducted since the last annual meeting of the institute. He also pointed out that the institute had developed for the first time an all-porcelain enamel kitchen. Mr. Smith also told of the production of a new sound-slide film known as "The Lifetime Finish," and said that more than 30 copies of this film are now in active use by manufacturers of porcelain enamel products. For 1938, he urged more contact with manufacturers and users of porcelain enameled products and the increased use of the institute's films by member companies.

One of the most outstanding presentations was given by H. D. Chase, of the Chicago Vitreous Enamel Products Co., chairman of the advertising and sales promotion section. This presentation, about 40 ft. wide and 6 ft. high, showed what the section had accomplished during 1937 and what was proposed for 1938.

He emphasized the fact that nearly 70,000 pieces of literature had been distributed by the institute office during the first eight months of 1937, principally as a result of advertising which has been carried this year in retail trade and technical publications. He also emphasized the fact that the industry's sales had increased considerably more than the sales of general business for the first eight months of this year, and pointed out that even though there was no definite evidence to prove a connection, the only effort which the industry had made to increase its

(CONTINUED ON PAGE 83)

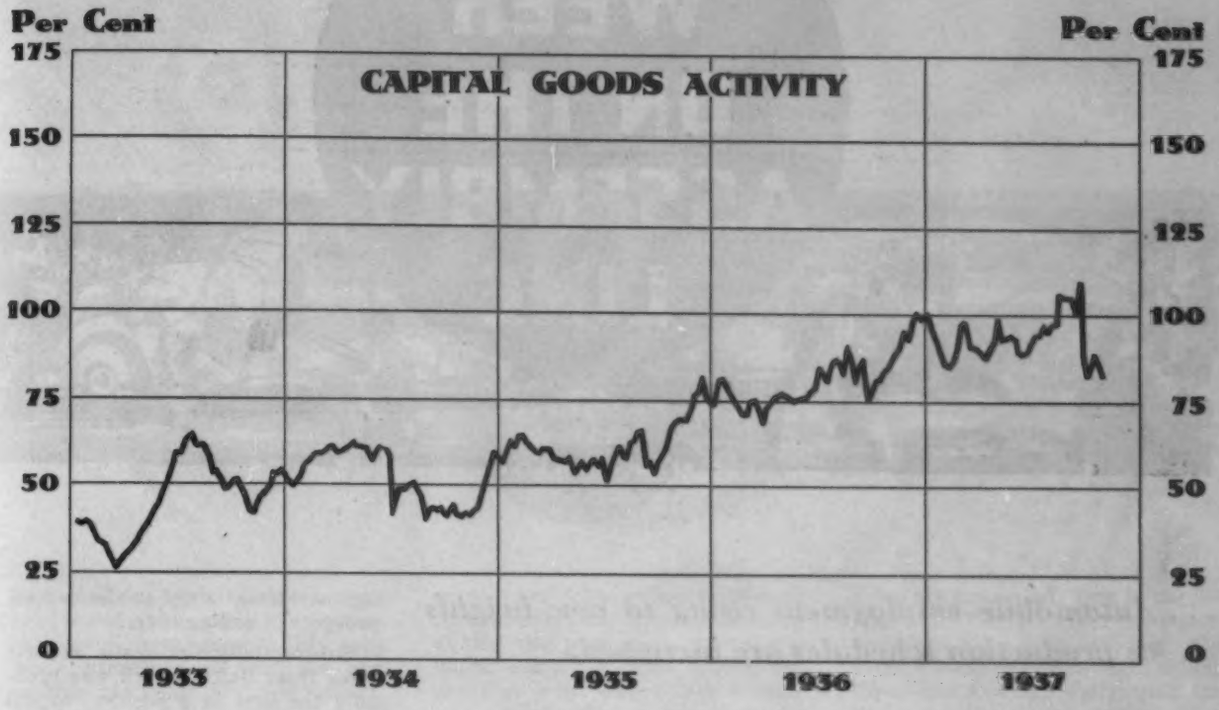
Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	September 1937	August 1937	September 1936	Nine Months 1936	Nine Months 1937
Raw Materials:					
Lake ore consumption (gross tons)[a]	5,157,411	5,373,264	4,026,690	31,434,081	45,141,121
Coke production (net tons)[b]	.....	4,829,862	3,994,741	33,112,191	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	3,410,371	3,605,818	2,711,721	21,564,508	30,221,640
Pig iron output—daily (gross tons)[c]	113,679	116,317	91,010	78,703	110,702
Castings:					
Malleable castings—production (net tons)[d]	.....	49,022	46,552	407,310	.....
Malleable castings—orders (net tons)[d]	.....	49,376	44,361	395,626	.....
Steel castings—production (net tons)[d]	.....	92,089	76,617	587,427	.....
Steel castings—orders (net tons)[d]	.....	54,753	56,877	613,827	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[c]	3,401,869	*4,875,671	4,151,388	33,526,142	42,498,769
Steel ingot production—weekly average (gross tons)[c]	1,005,110	*1,100,603	969,950	856,570	1,089,712
Steel ingot production—per cent of capacity[c]	76.52	*85.79	74.05	65.40	83.12
Finished Steel:					
Trackwork shipments (net tons)[e]	8,101	7,530	5,722	52,931	77,891
Fabricated shape orders (net tons)[g]	117,859	117,612	118,158	1,189,878	1,315,240
Fabricated shape shipments (net tons)[g]	154,295	158,228	145,521	1,135,598	1,237,139
Fabricated plate orders (net tons)[d]	.....	30,212	34,302	356,107	.....
U. S. Steel Corp. shipments (tons)[h]	1,047,962	1,107,858	961,803	7,867,707	10,956,846
Ohio River steel shipments (net tons)[i]	122,600	133,650	95,705	785,381	1,007,645
Fabricated Products:					
Automobile production, U. S. and Canada[k]	175,620	405,064	139,820	3,461,468	3,910,418
Construction contracts, 37 Eastern States[l]	$207,071,800	$285,104,100	$234,271,500	$2,041,628,000	$2,307,014,300
Steel barrel shipments (number)[d]	.....	771,427	787,380	5,974,024	.....
Steel furniture shipments (dollars)[d]	.....	$2,022,913	$1,549,808	$13,710,553	.....
Steel boiler orders (sq. ft.)[d]	.....	917,927	1,055,502	7,901,565	.....
Locomotive orders (number)[m]	8	39	24	158	278
Freight car orders (number)[m]	1,195	1,490	3,100	37,348	47,805
Machine tool index[n]	210.7	179.8	118.5	†132.0	†187.2
Foundry equipment index[o]	231.8	257.5	161.0	†155.3	†231.2
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	61,489	59,993	487,775	.....
Imports of pig iron (gross tons)[p]	.....	7,952	15,080	137,607	.....
Imports of all rolled steel (gross tons)[p]	.....	26,982	28,618	200,240	.....
Total iron and steel exports (gross tons)[p]	.....	886,319	235,577	2,459,247	.....
Exports of all rolled steel (gross tons)[p]	.....	286,774	74,489	790,422	.....
Exports of finished steel (gross tons)[p]	.....	202,949	66,068	716,598	.....
Exports of scrap (gross tons)[p]	.....	473,933	152,290	1,589,980	.....
British Production:					
British pig iron production (gross tons)[r]	.....	712,600	650,800	5,696,800	.....
British steel ingot production (gross tons)[r]	.....	987,700	1,027,000	8,618,000	.....
Non-Ferrous Metals:					
Lead production (net tons)[s]	41,046	46,965	32,982	330,115	387,641
Lead shipments (net tons)[s]	53,850	54,551	50,685	351,806	468,768
Zinc production (net tons)[t]	50,027	48,309	42,210	384,331	436,107
Zinc shipments (net tons)[t]	47,737	50,643	51,775	391,607	467,545
Deliveries of tin (gross tons)[v]	8,245	7,580	6,200	55,725	65,240
Copper production, refined (net tons)[w]	90,982	*82,835	75,892	748,660	740,893

†Three months' average. * Revised.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary from Automobile Manufacturers Association—Final figures from Bureau of Census. [l] F. W. Dodge Corp.; [m] *Railway Age*; [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange; [w] Copper Institute.



The Iron Age Weekly Index of Capital Goods Activity

(1925-27 = 100)

Last week	82.5	Same week 1934	41.4
Preceding week	85.7	Same week 1933	46.7
Same week last month	82.9	Same week 1932	33.2
Same week 1936	83.6	Same week 1931	49.8
Same week 1935	66.0	Same week 1930	74.0
Same week 1929	115.1		

DECLINING further, THE IRON AGE seasonally adjusted index of activity in the production and distribution of durable goods now stands at 82.5 per cent of the 1925-27 average. The index of steel ingot production led the losses in weighted importance, having lost 8.9 points in a continuation of its contraseasonal decline. Carloadings of lumber products ended the steady decline of the past month and a half and moved upward 5.1 points. The heavy construction awards series showed an advance of 1.5 points when compared with the preceding week which was a short week due to the holiday. However, when compared with the last full week the index has lost 0.1 point. Industrial activity and shipping operations in the Pittsburgh district continued to decline, and the index figure for this factor now stands at 84.6, as against 88.1 a week ago.

	Latest Week	Change from Preceding Week
Steel production (per cent of capacity)	55.5	—8.0
Automobile production (number of cars and trucks)	91,905	+2,270
Railroad loadings of forest products (number of cars)	37,227	+3,226
Pittsburgh industrial production and shipments (index number)	84.6	—3.5
Construction contracts awarded (total value)	$43,946,000	+$9,787,000

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

THIS WEEK ON THE ASSEMBLY LINE

. . . Automobile employment rising to new heights as production schedules are increased.

o o o

. . . Sales volume is encouraging; Buick output over 1200 cars a day.

o o o

. . . Further buying of materials by motor car makers expected this week.

o o o

. . . European buying bolsters machine tool sales; large automotive plant for Italy.

DETROIT, Oct. 25.—With the Auto Show under way in New York, assembly plants from coast to coast are being pushed to record daily outputs and, with that, national employment in the automobile industry is rising to new heights.

Detroit employment, after one of the sharpest recoveries ever seen in this area, is on its way to a new all-time high, according to Willis H. Hall, of the Industrial Department of the Detroit Board of Commerce. "Unless the whole world should go to smash, I do not see how we can fail to establish a new record by Feb. 1, 1938," Hall said.

Exceeding all levels for October and November, the employment index of Oct. 15 in the Detroit metropolitan area reached 120.8, compared with the previous October high in 1929, when the index reached 107.5. The index was 99.6 on the same date last year. The existing all-time high was established March 1, 1929, when the index reached 137.8. The highest point reached since that date was 130.6 on May 15 this year. With several Detroit automotive firms and numerous suppliers still to reach full production, automotive opinion is that the Nov. 1 figure, barring unforeseen difficulties, will take another spurt. It is probable that a new record will be established some time during November or early December. This expectation is based upon the fact that all the automobile companies and suppliers intend to produce record volumes before the first of the year. The "if" in this case is the Ford unionization campaign.

Sales Are Encouraging

But employment indices and production figures, no matter how large they are, would mean very little if the assumption were true that the automobile plants are merely building thousands of cars against time, with no immediate prospect of selling them.

Substantially optimistic reports come from Buick, which was probably the first in a position to sell and deliver 1938 cars. The rate of Buick sales since the first of October, when 1938 cars were released to dealers, is many times greater than that of the corresponding period a year ago. An accelerated pace is reported by W. F. Hufstader, general sales manager. At the same time he disclosed that Buick production is averaging better than 1200 cars a day. On hand is a sufficient number of orders to maintain capacity operations through the first of the year. Although available retail delivery figures cover only the first 10 days of the month, they show that 4740 cars were delivered to customers in the United States, compared with 917 in the first 10 days of last October. Sales for the period were the best since 1929, when Buick announced new models in August with full stocks in the hands of its dealers. The pre-announcement volume is the greatest in Buick records. In the period between Oct. 15 and Dec. 31, Buick expects to build another 65,000 cars.

In another price class, Plymouth reports 39 per cent more orders than at the same time last year.

The delivery situation on new cars is aptly illustrated by the experience of a steel company's representative in Detroit, after he ordered a new model. Delivery of the car was delayed several times, but finally was promised for this Monday. Not satisfied, the steel man wrote the president of the automobile company, pleading for special service and rapid delivery.

The middle of last week the factory telephoned him the information that special arrangements had been made, upsetting all schedules and putting his order ahead of others, so he would get the car by Wednesday at the earliest.

Hudson's Record Best in 12 Years

While still unable to report any sales figures, Hudson reveals that its production is the best in 12 years, running higher than in any October since 1925. In the week ended Oct. 16 the company shipped 4388 cars. Last year during the corresponding week it shipped only 2290 cars. Hudson customers will find only minor changes on price tags for 1938. Increases on the volume models are less than 2 per cent. On some of the higher priced groups, reductions are apparent, due to a re-alinement of the accessory policy. According to Hudson, the new prices include all essential and some deluxe accessories. The range of increases is from $13 to $27 on all closed models; reductions up to $11 apply to the custom eights. During August when all automobile prices were raised, Hudson announced increases of $35 to $45.

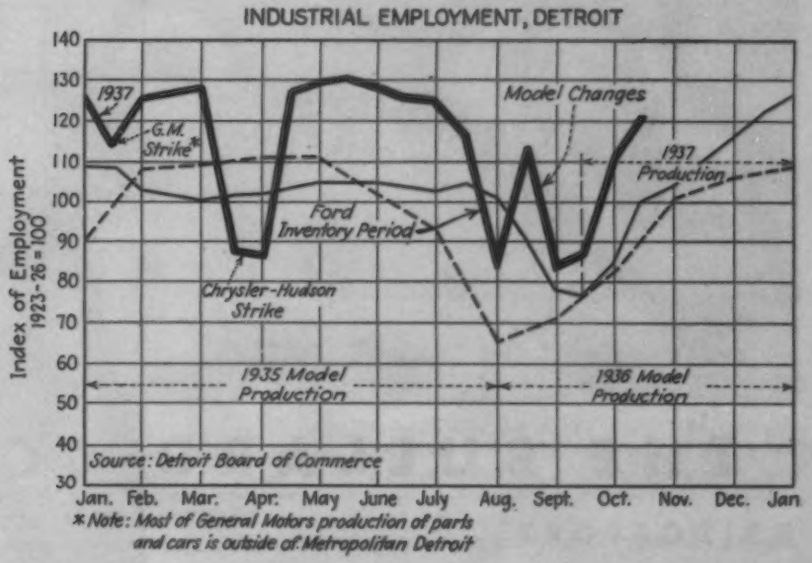
Packard is running its assembly line 16 hr. a day and has many departments working 24 hr. a day to keep up production and satisfy demand for its new cars; other automobile companies that are in production are following similar schedules. However, Ford last week produced only about 500 cars, although the company had intended to have 10,000 built by the end of the week. Output should continue to rise for several weeks more at a faster rate than was manifested during the last seven days. According to Ward's Automotive Reports, production during the past week was 91,905 units, compared with 89,635 the previous week and 64,310 a year ago. Meanwhile, new passenger car sales, reported by R. L. Polk & Co. for 42 states for September, were 187,476, which is 10.99 per cent higher than sales from the same number of states in September last year. A decrease of 1.76 per cent is indicated in truck and commercial car sales. Registrations in 42 states for this September were 42,820.

Ford Shows New Cars

Advance showing of 1938 Ford V-8 cars and trucks opens Wednesday at Ford metropolitan showrooms at 1719 Broadway, New York. Two distinct Ford V-8 cars differing in appearance, appointments and price are presented. One is the deluxe Ford V-8, the other the standard Ford V-8. Both cars have the same V-8 chassis. The Eight deluxe types are available only with the 85-hp. or the 60-hp. engine. The deluxe car is entirely new in appearance. The radiator grille is new, hood longer and more sweeping, and fenders are massive. Substantially more room in the closed sedans and much larger luggage space are provided. The standard V-8 is restyled with a different radiator grille design and long hood.

Ford also presents an expanded line of V-8 trucks and commercial cars. A new group of one-ton trucks is offered in addition to the 112-in. commercial cars and the 134-in. wheelbase trucks. The new 134-in. wheelbase truck replaces the 131½-in. wheelbase in the big truck line.

So far automobile men have seen

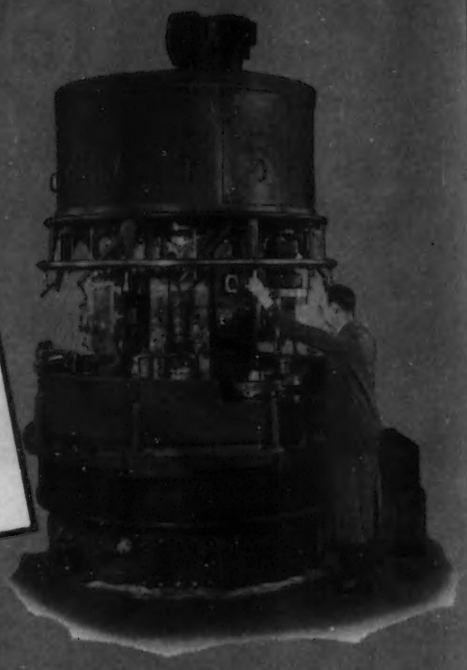


NIGHT LETTER

ED. PURCHASE
AUTOMOTIVE MANUFACTURING COMPANY
AUTOMOBILE CITY, MICHIGAN

VISITED BULLARD COMPANY TODAY STOP WATCHED JOBS RUN OFF ON TYPES J AND D MULT-AU-MATICS STOP RIGIDITY OF MACHINES EXCEPTIONAL STOP RANGE FEEDS AND SPEEDS TAKES FULL ADVANTAGE OF METALLOID CUTTING TOOL POSSIBILITIES STOP THESE ARE PRECISION MACHINES WITH COST CUTTING POSSIBILITIES PLUS STOP ADVISE IMMEDIATE ORDER OF ADDITIONAL EQUIPMENT BASED ON BULLARD ESTIMATES STOP FAST ACTION NECESSARY IF EARLY DELIVERY DESIRED

JOHN METHOD
CONSULTING ENGINEER



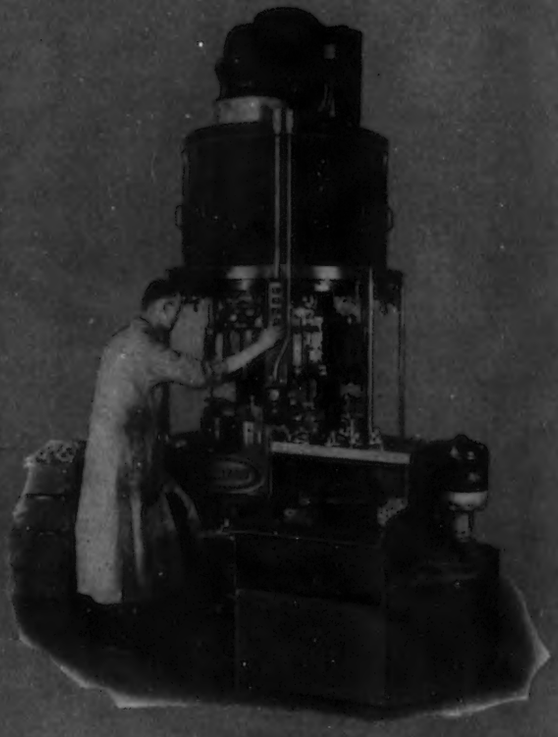
IF you know Mult-Au-Matics and their Performance record, you will agree that John Method's lengthy wire was Good Business.

JOHN METHOD obviously believes that additional Profits can be derived by concentrating on the Mult-Au-Matic Method of machining.

IF you DON'T know about the Mult-Au-Matics, we invite your investigation.

IF OTHERS CAN PROFIT WITH MULT-AU-MATICS, SO CAN YOU

Ask for Bullard Estimates on your work



THE BULLARD COMPANY

BRIDGEPORT CONNECTICUT

only two sore spots, the one dealing with price increases and the other, of course, the labor situation which still remains unsettled. However, on the price situation M. M. Gilman, Packard vice-president and general manager, offers additional justification. "In connection with increased costs," he said "it is of interest to note that during 1938 we will pay the Government approximately $1,250,000 as our assessment under the Social Security Act. That will be the equivalent of from $8 to $10 for every car we make during the year. This item, however, is just one of hundreds adding to the cost of manufacturing automobiles." So far indications are that price increases have not adversely affected sales, Mr. Gilman said.

New Steel Purchases Expected

Confirmation may be forthcoming late this week from the steel companies and automobile manufacturers on the placing of some large orders for steel. A close check indicates that all the automobile companies are committed for parts to last until Jan. 1.

Industrial Construction Slumps

Industrial building activity in Detroit threatens to reach an absolute zero. Since figures were taken several weeks ago for a new press shop at the Ford Motor Co.'s Rouge plant, only one other project has come to light. That is the new baseball stadium to be erected by Walter O. Briggs, president of the Detroit Base Ball Club. This will involve approximately 3600 tons of structural steel and probably also a sizable tonnage of reinforcing bars. However, home building continues at a brisk pace.

Foreigners Buying Tools

Technical experts from Europe are in Detroit to purchase machine tools and other equipment for a large automotive plant to be erected by the Fiat Co. in Italy. It has been learned that Fiat will abandon its present four-story building, noted for the race track and test ground on the roof, and erect a modern single-story structure 2700 x 2000 ft. for the manufacture of gasoline engines and small diesel engines for motor cars, trucks, buses, tractors and tanks. A separate building for heat-treating and a foundry also will be erected. Another heavy buying program by Russian interests resulted recently in the purchase of 20 large grinders from a Michigan manufacturer.

New Diesel Development

The Hercules Co. has added a series of four-cylinder high speed diesels for use in light commercial vehicles as well as for industrial, agricultural, oil field and marine applications. Three new engines are in the series, rated at 56.5, 62 and 70 hp. Structural details include rigid crankshaft with five bearings electrically hardened. The crankcase is cast integral with the cylinders, pistons are aluminum alloy, connecting rods are heat-treated nickel chrome molybdenum steel, rifle drilled for lubrication. This line now ranges from 56.5 hp. to 176 hp. and nine different engines are offered.

Meanwhile, Detroit's only tractor plant is scheduling another 2500 units. The Graham-Paige Co., after building 250 Graham-Bradley tractors on its first run, will start Nov. 1 on this second production order, to be completed before the end of the tractor selling season.

New Refrigerator Models Shown

Taking a tip from the automobile industry, the Frigidaire Division of General Motors has announced new models this fall and now has on display new models of household units. Formerly not introduced until spring these electrical refrigerators are part of the General Motors exhibit at the Waldorf-Astoria during New York Auto Show week. For the first time the Frigidaire Division is manufacturing electric ranges and will display five new models along with heat and air-conditioning units fostered jointly by Delco and Frigidaire.

Carborundum Unit Sold

Assets and good will of the Hutto Machine Division of the Carborundum Co. have been sold to Micromatic Hone Corp., Detroit, and Barnes Drill Co., Rockford, Ill.

The business will be subdivided by the purchasers. Barnes will absorb the manufacture, sale and service of honing machines and gear lapping machines, and Micromatic will take over the manufacture, sale and service of honing tools and tool replacement parts. Micromatic will also carry a full line and render replacement service of Carborundum brand cylinder honing stones and other abrasive honing sticks.

The Hutto plant, which has been closed by a sit-down strike for five weeks, was reopened as Micromatic Hone Corp., Hutto division. Full operations were resumed Monday, the strike having been settled on terms favorable to the workers and the new management.

There will be no reduction of personnel of the Hutto division. Kirke W. Connor will be chief executive of combined organizations relating to honing tool manufacture. Announcement of other executive personnel will be made later.

Labor and Politics

The American Federation of Labor in Detroit officially rejected endorsement of the CIO municipal candidates last week. This, political observers agree, greatly increases the possibility that Patrick H. O'Brien, the CIO man, will lose the election to Richard W. Reading, who now has AFL support. The exact status of the two candidates remains in doubt, however, because a large faction within the AFL held a rump convention in defiance of Frank X. Martel, president of the Detroit and Wayne County Federation of Labor, and no one knows the voting strength of this group.

FASTER than any time in 12 years, Hudson's cars are shown leaving the assembly line. Shipments of 1938 cars are more than double that of last year up to this date, according to William R. Tracy, a Hudson Motor Car Co. vice-president, who also announced new prices which show only minor changes over late 1937 prices.

WASHINGTON. . . . . .

. . . Railroads ready to make higher rates effective, request further rise to offset increased costs.

o o o

. . . Administration adopts policy of saying nothing about stock market decline and recession in business.

o o o

. . . Labor unions' attacks on pending wage, hour bill embarrassing drive for enactment at coming session.

o o o

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

o o o

WASHINGTON, Oct. 26.—Railroads and water carriers are hastening to place into effect the nation-wide increased freight rates on basic commodities granted Oct. 22 by Interstate Commerce Commission.

Applying to manufactured iron and steel, iron ore, coal, coke, along with other commodities, the new rates, estimated by the ICC to swell Class I railroad revenues $47,500,000 annually, can quickly be made effective on "sixth section" (short notice) application by the carriers.

To this end experts of the Association of American Railroads assembled yesterday in Washington to prepare the new tariffs.

Partly Satisfied

Only partly satisfied with the ICC freight rate advance, the railroad leaders hoped for still more relief and J. J. Pelley, the Railroad Association president, said:

"I can see no escape from the necessity for additional railroad revenues beyond the increase in rates just granted if we are to carry the added costs (mostly higher wages for labor) already upon us."

Typical of the railroad industry's reaction to the long-awaited increase was a statement by Daniel Willard (sponsor of the controversial two-cent mile for rail passengers) that "the increase . . . will evidently be little, if any, more than half the amount which the railroads as a whole lost when the surcharges were discontinued the first of last January, and it is natural that from that aspect the order should be disappointing.

Needs Recognized

"But, a careful reading of the report," said the B. & O. president, indicates the commission fully realizes needs of the carriers for further additional revenue and is prepared to give prompt consideration to that matter."

Disappointed that the commission did not grant all the requested increases, the association member roads were to meet in Chicago today (Oct. 28).

Meanwhile the rate increase granted under the "sixth section" provisions, could be made effective in one to 15 days as distinguished from the so-called statutory period of 30 days. Inasmuch as in large part the increases granted meet fully with the petition for higher rates, it is probable that the preparing and filing the tariffs will be relatively simple.

Granting fully the petition for increased rates asked for on manufactured iron and steel products, including cast iron pipe, the Commission authorized an advance of 10 per cent, with a maximum of 1c. per 100 lb. On lake iron ore the increase allowed is 5c. per net or 6c. per gross ton, except for the movement from Minnesota mines to Lake Superior docks.

No Raise For Most

Thus on the bulk of shipments from mines to upper Lake docks there will be no increase in ore rates since, according to the commission, the 1937 Lake Superior ore movement is estimated at 65,000,000 tons, most of which will come from the Mesabi and Vermilion ranges.

The Lake ore increases, however, will be applicable to Michigan and Wisconsin ore from ranges to upper docks as well as from lower docks (ex-Lake) to interior furnaces. Thus there will be a dual increase, amounting to a total of 10c. per net and 12c. per gross ton, on shipments from Michigan and Wisconsin ranges, while only a single increase will apply to Minnesota ore shipments—from lower docks to interior furnaces.

The 5c. per net or 6c. per gross ton will also apply to Eastern and

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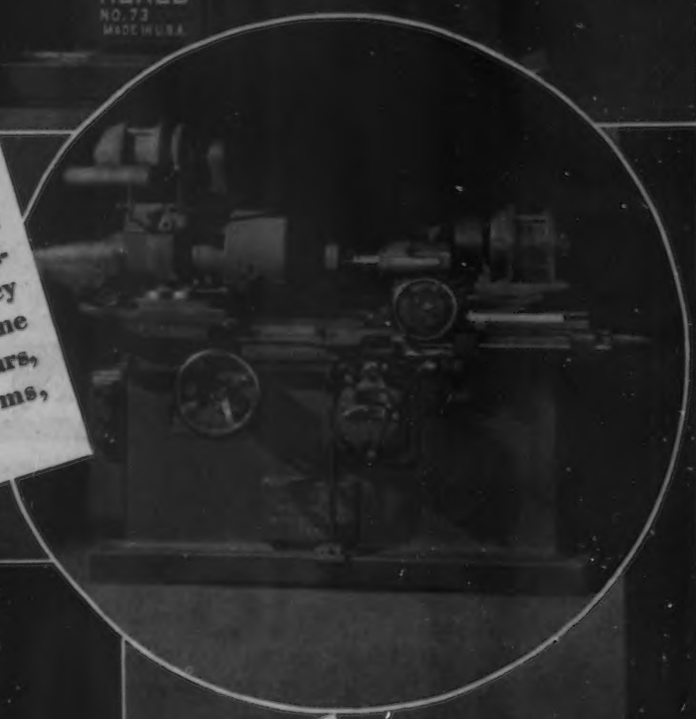
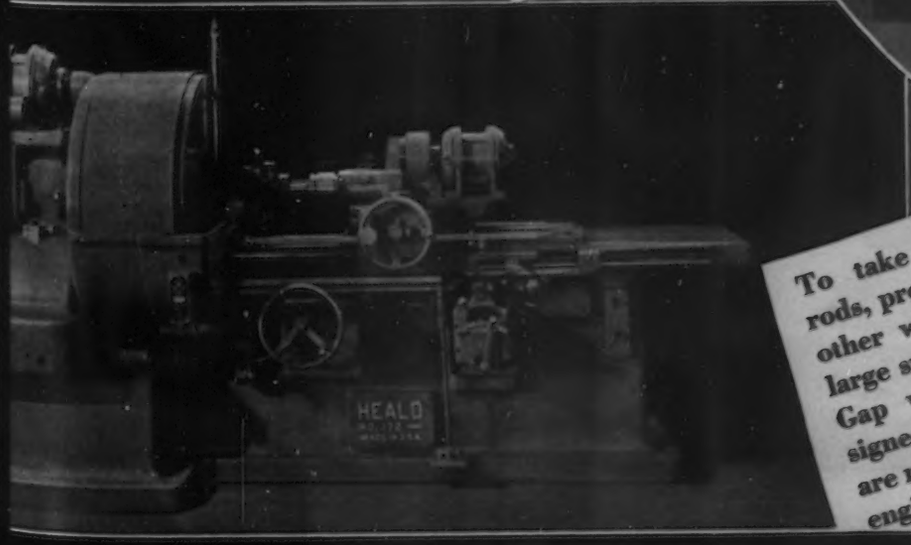
Heald No. 73 Airplane Engine Cylinder Grinders are being used by various airplane manufacturers the world over for obtaining perfect cylinder bores.

These machines are unquestioned equipment in all of the large airplane motor manufacturing plants.

The No. 72 Plain Internal is a general all around machine giving that ultra-fine finish and accuracy demanded by airplane manufacturers in gears, bushings, rolls, cams, and similar work.





To take care of long rods, propeller hubs and other work requiring a large swing, the No. 172 Gap was especially designed and built. Many are now used on airplane engine work.

The *Heald* Machine Co., Worcester, Mass., U. S. A.

imported ore. On Alabama ore an increase from 40c. to 50c. per ton was granted.

On coke and bituminous coal the increases range from 3c. to 10c. per net ton. On scrap iron and steel an increase of 20 per cent with a maximum of 2c. per 100 lb. was granted in the Western district and between that and other districts. The proposal to increase scrap rates in other territories by canceling the 12.5 per cent column rating at 75,000 lb. minimum per carload was withdrawn and has been included in another tariff. Limestone was not included with products on which higher rates had been asked.

No Opposition

The commission said that the principal iron and steel manufacturers did not oppose the proposed increases in rates on their products, although some of them asked that the proposed rates not be approved for permanent or indefinite application. All the increased rates, however, are to be permanent and partly replace the surcharges which were terminated Dec. 31, 1936, and were estimated to net $100,000,000 increased revenue annually. Cast iron pipe manufacturers strongly opposed increased rates on their product.

Under the decision, the present iron ore rate of 91c. per gross ton will continue in effect from all Minnesota ranges for an average weighted haul of 95 miles. On the other hand, such standard rates as that of 82c. applying from the Gogebic range in Michigan to Ashland, Wis., from the Marquette range in Michigan to Escanaba, Mich., and from the Menominee range in Michigan and Wisconsin to the same place, will be increased to 88c. for the weighted average haul of 59 miles.

Ex-Lake Rates Up

With the increase of 6c. per gross ton, new rates from Lake Erie ports to prominent destination groups will be as follows: Youngstown, 88c.; Leetonia, Ohio, 94c.; Midland, Pa., $1.05; Pittsburgh, Pa.-Wheeling, W. Va., $1.21; Johnstown, Pa., $1.36; Donora, Pa., $1.28.

Opposition to any increase in the rates on ore from the mines to upper Lake docks was made by the Lake Superior Iron Ore Association on the ground that the traffic is now bearing more than its fair share of the burden of maintaining the rail transportation system. Holding with the association as to rates on Minnesota ore to upper docks, the commission said that the Duluth, Missabe & Northern, and the Lake Superior & Ishpeming railroads, which have little other traffic than Minnesota iron ore, are among the few outstanding examples of railroad prosperity.

Those two lines, together with the Great Northern and the Chicago & North Western, handle about 90 per cent of the total amount of Lake ore. It was stated that earnings of the Great Northern from its ore traffic are fully as profitable as those of the D., M. & N.

Free To Ask Relief

"Since the carriers serving the Minnesota ranges are free to propose increases in their ore rates without preliminary relief by way of modification of outstanding orders," said the commission, "the issue is substantially the same as it would be if proposed increased rates on ore were under consideration in a suspension proceeding, and the carriers have the burden of showing that the proposed increased rates would be just and reasonable."

In contrast with the position of railroads serving Minnesota mines, the commission said that the carriers serving Michigan mines as a whole are in a very unfavorable financial condition, due to shrinkage in the ore traffic of the Chicago & North Western and the Chicago, Milwaukee, St. Paul & Pacific. The commission stated that in view of the clear financial needs of most of the railroads which move Michigan ore and other circumstances, it is "of the opinion that the proposed increased rates from these ranges are justified."

Not Favoring Either

In granting the increased rates on Lake ports of interior destinations, the commission declared that a single increase would have the effect of depriving the lake front furnaces of the advantage of their location "and it is not our function to equalize competitive advantages and disadvantages of this kind."

The commission also pointed out that the railroads participate separately in the Lake ore movements. The intervening water movement, it was stated, is by vessels which are not common carriers "and nothing in the transportation service savors of a common arrangement." The Northern rail carrier and the Eastern rail carrier, it was said, are each entitled to

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That will NOT CORRODE
That will NOT DISINTEGRATE

HAVEG TANKS

Haveg tanks molded solid of a phenolic resin asbestos composition provide unusual resistance to acids commonly used in pickling. Made in one piece seamless units as large as 9′ 6″ long by 6′ wide by 6′ deep or as long as 13′ with a proportionate reduction in cross section, and still larger in sections. Let us tell you more about Haveg tanks, piping, equipment. Send for bulletin 1A one.

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CLEVELAND . CHICAGO . LOS ANGELES
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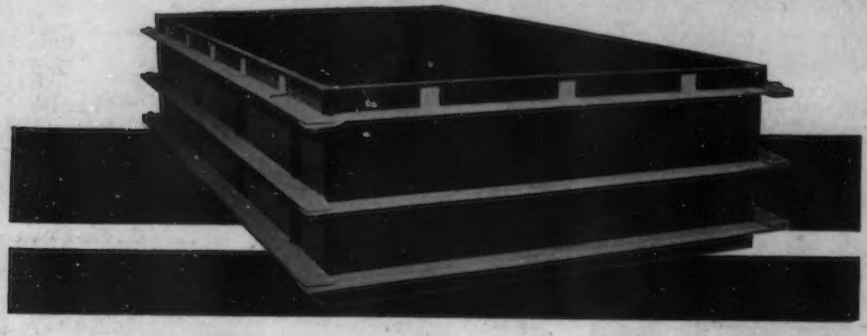

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ELECTRIC WELDED TUBING . . . For all Mechanical Purposes.

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proper compensation for the service which they perform, irrespective of the amount received by the other.

The increased rates on bituminous coal are to be terminated Dec. 31, 1938, unless the Chesapeake & Ohio, the Norfolk & Western and the Virginian railroads, which it was stated, are not in need of additional revenue, agree to a pooling arrangement under which the revenue derived from the increases would be so divided that the benefits would largely be confined to lines in need.

Coal Increases Shown

Increased rates granted on bituminous coal and coke in the territory which roughly is bounded on the west by the Mississippi River are shown in the following table:

Where the rate per net ton is—

	Increase
0.0c. to 75c.	3c.
76c. to $1	5c.
Over $1	10c.

Where the rate per gross ton is—

	Increase
0.0c. to 84c.	3c.
85c. to $1.12	5c.
Over $1.12	11c.

The foregoing rates apply on coal to Milwaukee, Racine, Kenosha, Wis., Waukegan, North Chicago and intermediate points. The Western scale increases range from 3c. where the rate is up to 75c. to 15c. on rates over $2.

Where rates from Illinois, Indiana, and western Kentucky are not increased by the maximum under the Western scale, rates from Eastern and Southern origin groups will be increased 10c. per net ton. Rates established to meet truck and water competition, where emergency charges are not now applied, will not be increased.

Ex-River Rates Up

Ex-river coal rates from Conway, Colona, Pa., etc., except those covered in the Western scale, are to be increased in the same amounts in cents per ton as the all-rail rates from the Pittsburgh district to the same destinations are increased.

Increased rates were granted on the basis of financial needs of the railroads. They will also apply to Mountain-Pacific territory, while an increase in transcontinental rates on liquefied petroleum gas was permitted.

As to other Mountain-Pacific and transcontinental rates, which have been the subject of hearings, no specific findings were made, but the carriers were authorized to file tariffs publishing the rates which they have proposed, subject to possible suspension. The commission turned down the proposal to increase ratings of fifth-class and certain sixth-class articles in Official Classification territory.

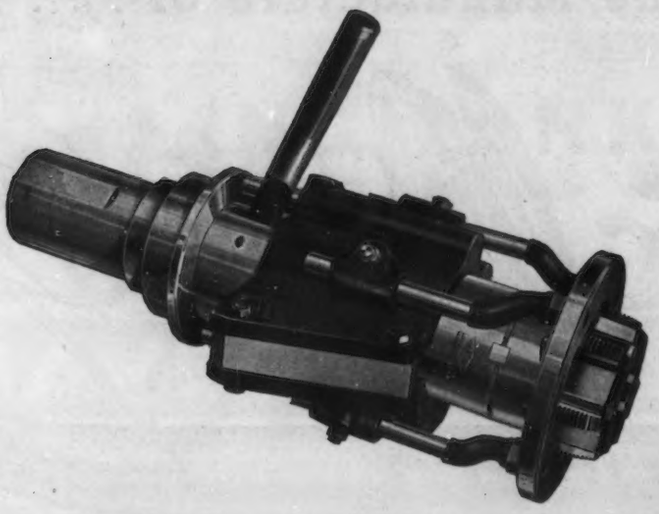
Little Buying to Result

Because of the railroad complaint that the increases are inadequate, it is definitely not expected that those granted will bring about any substantial new buying of equipment. On the contrary it is maintained that the estimated increased revenue will fall short by more than 50 per cent of wage increases alone, which are estimated to have increased the railroad payroll by $100,000,000 annually.

Railroad officials have estimated that the increased freight rates, together with those to be asked, will just about cover increased wage costs. Last Saturday the commission granted Southeastern carriers increased coach fares which will be upped to 2c. from 1.5c. per mile. Increases also have been asked on Western coach rates but it is proposed to maintain the basic rate of 2c. At the same time Eastern carriers are preparing to ask for an increase in coach fares from 2c. to 2.5c. per mile.

Western Gas Division of the Koppers Co., Fort Wayne, Ind., has been awarded a $95,000 contract for three motor-driven hoists to operate the spillway control gates of Alcova dam, the Kendrick project in Wyoming.

You Need the *Accuracy* and *Quality* of LANDIS Receding Chaser Taps



LANDIS Collapsible Taps are more adaptable to a greater range of sizes and are more economical to install.

The detachable head feature, the accurate size adjustment and the rugged construction of the LANDIS Collapsible Tap, make it indispensable for your internal threads.

You are assured *accuracy* and *thread quality* when you use LANDIS Taps. Write for more information.

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BETWEEN THE LADLE AND *You*

. . . are the scientific methods of control so necessary in making fine quality Cold Finished Steel. Modern metallurgy plays an important part in maintaining the high manufacturing standards found in B & L mills.

With the latest types of equipment for analysis and tests, B & L metallurgists carefully check the physical properties of the steel, and accurately determine its suitability for the job it is to do. To meet specified hardness limitations, Brinell testing is applied to hardened finished specimens as well as to the bars prior to cold finish.

This and other hardenability tests give close control over special steels for heat treated or annealed materials . . . to provide good machining range . . . or to indicate strength and wear resistance in finished machine parts. A rough estimate of tensile strength can be determined by dividing Brinell hardness by 2 and multiplying by 1000.

You may find the solution to your own problems in using these "Better Made Steels—Laboratory Tested."

BETTER MADE STEELS
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Cold Drawn Bars • Ground Shafting • Ultra-Cut Steel • Special Sections • Extra Wide Flats Alloy Steel

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HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

Administration Silent Regarding Possibility of Further Deflation

WASHINGTON, Oct. 26.—The crash in the stock market, the recession in business and the financial pinch have stirred official circles much more than they pretend outwardly.

Conferences over the situation have brought forth no plans of action to offset the backward movement. Indeed there is apparently a strong feeling that it is good policy to make no public moves at present. In the first place there seems to be a serious question as to what, if anything, could be done. Secondly, fresh in the memory of authorities is the 1929 crash and efforts to stop or mitigate it by reassuring statements.

It was found that instead of being a steadying influence, the optimistic statements were followed by further drops in the market. Instead of inspiring confidence as intended they were construed as reflecting fear and emphasizing the seriousness of the situation. Based on this experience, it seems to be the policy not to issue statements. Unless the hum of hate and sour whistling of Jim Farley can be taken as an oblique means of sounding the New Deal note. The policy of silence, barring Farley, seems to be recognition of the fact that there are things not to do.

Not Indifference

It is due, as reported, not because of indifference to Wall Street or to lack of realization of possibilities in the sharply downward deflationary movement. The movement has been too vast to be coolly ignored or dismissed with ridiculous charges of bear raids and "Wall Street" conspiracy.

The Administration is well aware that the situation cannot be treated so lightly. Direct Administration comment on the crash apparently has been withheld not only because it may be interpreted as acknowledging the gravity of the situation but also because of the hope for a quick end of the crash and restoration of stabilized values. This hope has been given stimulation by the moderate rebound in values. The President was asked what he thought was about to happen in this country. Significantly or not, the reported response was "how can anyone tell when everything is in one man's head?"

Statistics on production and orders also are being pointed to as showing conditions are sound, even after allowing for the let down in such basic industries as steel.

Still Large Demand

The official hope is that these recessions are only temporary inasmuch as it is contended there still remains large unfilled demands that accumulated during the lean years of depression.

What may happen of course no one knows but both the optimists and pessimists are having their innings. Students of business curves who lean on the bright side say that the United States, like the rest of the world, really has not recovered from the depression that followed the 1929 stock market collapse and that it would be unprecedented to head into another prolonged nose dive until after return of prosperity.

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BY PARISH
The modern motor bus has "lines", and Parish created some of them. Take this wheel housing for example. A good stamping job involving a smooth 3" draw in steel .078" thick. The outside curve is 25 3/4" radius.
Parish knows metals and how to form them. This, plus adequate press equipment, enables us to undertake and successfully carry to completion any difficult pressed metal job you can put up to us.
This service is for you. Won't you avail yourself of it?
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PACIFIC COAST REPRESENTATIVE
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They do not think, however, that recovery can be purchased by continued huge outlays of Government money. On the contrary, they think this has been a factor in developing the business setback and the shrinkage in security values. They counter the school of thought that the break in the market was partly due to the check in Government spending. Such spending is held to be an effort to lift one's self with one's bootstraps.

Means Higher Taxes

These expenditures mean increased taxes, huge Government debt, deficit after deficit and a greatly unbalanced budget. This spending policy, with heavier taxes, all sorts of strange legislative experimentation, one heaped upon another, bitter attack on business, all are said to have developed a bad case of "jitters" and a loss of confidence in the Government, and to have been largely responsible for the misbehavior of the stock market and the drop in business of the basic industries.

The New Deal resents these claims but it is clear they are not confined to "Tory" sources. They have been conceded by sources that are not hostile to the New Deal, though palpably less sympathetic toward it than heretofore.

The New Deal itself apparently recognizes at least some of its errors. In some directions at least it is trying to cut down in the spending orgy, or is making motions in that direction.

Some of the alphabetical agencies are in the process of trimming their activities though not to the extent that they should, and there seems to be more earnestness than heretofore in talk of economy. On the other hand, the New Deal is determined further to tap the Treasury to feed more pap to the farmer to "stabilize" prices and to establish an "ever-normal" granary, as desired by Henry Wallace, the streamlined Joseph; to peg cotton at 12c. while corn is tentatively fixed at 46c. Which, of course, may not be a bad idea politically in view of the approaching Congressional election even if it is tough on the taxpayer. It sounds incongruous, however, when considered in connection with the shouting over anti-trust revision.

Moderation Doubtful

The question has been raised as to whether the stock market crash with growing criticism of Government spending and increasing demand for a balanced budget will moderate the legislative program of the New Deal.

There is no indication that it will have any effect on the New Deal program, despite the fact that the crash itself showed that regulation broke down. This is not a criticism of reasonable regulation, but it does show that the forces back of such a major movement as developed in the stock market cannot be checked by Government dicta.

In its drive for wage-hour legislation the Administration again is running into attempted regulation which will fail just as NRA did. Control and policing wages and hours of such an enormously complicated structure as American industry by a National Labor Standards Board and regional board is a tremendous bite, one that will prove indigestible.

Nevertheless, a wage-hour bill, according to the general opinion in Washington, will be enacted, unless balked by organized labor itself possibly at the forthcoming special session of Congress, as the President proposes. But if not then it

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2000 TONS PER STROKE

Solid housing gives extreme rigidity. Four adjustable gibs give accuracy. Self-contained pump. High ram speed at low pressure. Rapid traverse speeds production. Gibs 48" apart. Daylight 24". Single hand lever control with automatic high pressure.

A typical application of this new Lake Erie heavy tonnage precision press is found in the plant of a midwest manufacturer, using two such presses on high production embossing operations.

If you have a high speed, accurate pressing problem, we will gladly forward further details of this new press design.

LAKE ERIE
ENGINEERING CORPORATION
68 KENMORE STATION BUFFALO, N. Y.

likely will be jammed through at the regular session.

It is not the 40c. an hr. minimum wage or the 40 hr. week that are the cause of objection on the part of the basic and related industries. The wage is less by half that paid by such industries as steel. But the point is the bill would mean further and costly regimentation, more bureaucracy, and heckling of all industry. The "40-40" bill also has the weakness of disregarding living costs in different sections, freight rates, raw material costs, employment efficiency, etc.

It seems doubtful that the South in particular will, if it can help itself, permit enactment of a law which does not provide for wage differentials.

It is the constant regimentation of the economic life of the nation that unquestionably was a factor in bringing about national business "jitters" with the ensuing market crash and an uncertain future.

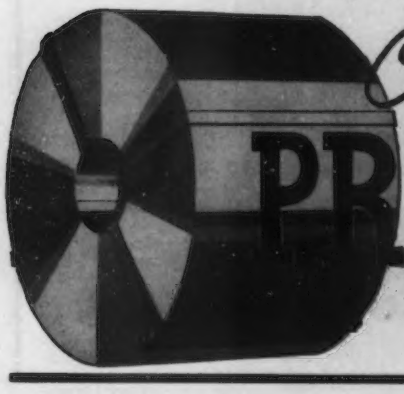
IN A ONE-PIECE COIL

• One-piece coils containing many miles of Cold Rolled Precision Strip Steel are regularly produced on our 4-high single stand reversing mills. Throughout their width and length, these long coils are exceptionally accurate to gauge, giving maximum square feet of surface per hundred pounds of metal and thus lowering your steel costs.

We will cut coils to any desired length or weight but urge you to specify the heaviest coils you can handle. The larger the coil, the fewer interruptions in your production.

You specify the analysis and temper you require and leave the matter of gauge tolerance to us. You will be agreeably surprised and more than satisfied.

The Cold Metal Process Co.
Youngstown, Ohio



Cold Rolled
PRECISION
STRIP STEEL

New Freight Car Total is 56,307

WASHINGTON, Oct. 26.—Class I railroads in the first nine months of this year installed 56,307 new freight cars in service, the largest number for any corresponding period since 1930, according to the Association of American Railroads.

In the same period last year, 27,178 new freight cars were put in service, and 3172 in the same period two years ago. New freight cars put in service in the first nine months of 1930 totaled 70,033. Of the new freight cars installed so far this year, coal cars totaled 28,669; box cars, including both plain and automobile, 21,903; refrigerator cars, 3843; flat cars, 1642; stock cars, 150; and miscellaneous cars, 100.

FTC Hearing On Cement Nov. 9

WASHINGTON, Oct. 22.—First hearing in the Federal Trade Commission's case against the Cement Institute and its producing members, charged with violation of the Federal Trade Commission and the Robinson-Patman acts through use of the multiple basing point system, has been set for Nov. 9 in Washington.

Assigned to the case as trial examiner is John W. Norwood. The FTC attorney is Walter B. Wooden. The case is held highly important because of the effort to abolish the basing point system in all industries.

Drop Forging Ass'n Receives Award

THE Drop Forging Association, Cleveland, has received a certificate of recognition from the Association of Trade Association Executives, which annually bestows awards in recognition of the work done by associations. The Drop Forging Association is one of two trade associations in the metalworking industry that was recognized. This certificate of recognition was awarded for forward-looking activity and for meritorious achievement in fostering and promoting true service to American industry through trade association activity. The certificates was signed by Daniel C. Roper, Secretary of Commerce, who is chairman of the jury of awards.

Housing To Stay Within Limit Of $1,250 Per Room, Straus Says

WASHINGTON, Oct. 26. — Nathan Straus, of New York, millionaire housing expert, recently named by President Roosevelt to administer the Government's new $526,000,000 low-cost housing and slum clearance program, is optimistic about getting results under the new law.

Straus, who made good by organizing a non-profit corporation financed by PWA funds and building his own housing project, Hillside in the Bronx, sees little difficulty in keeping costs down to $1,250 a room, the limitation imposed by the act for large cities. He says he built his Hillside project at a cost of $1,045 a room.

Harold Ickes, PWA generalissimo and Interior Department head who was pushing his protege, Howard Gray, for the post which the President turned over to Straus, has insisted that "even in the best of circumstances it will be difficult for a housing authority to operate under the Wagner-Steagall bill." The new housing administrator, however, refuses to concede that his agency is crippled by legislative restrictions.

Straus' ready-made staff will shortly wade through queries from some 150 cities interested in sharing the benefits of the program in an effort to determine what can be done for most of them who, admittedly, are not in a position to put up in cash the 10 per cent required by the act as their share of the cost. Another stumbling block harassing housing officials is the high cost of removing present slum buildings to make way for the new projects.

"My own job," Straus said after leaving a White House conference, "is to get the slums razed and get decent homes built. It's a job that calls for action and very little talk."

His first task, he explains, is to determine the broad policies of the new housing authority in which work he expects to consult both Ickes and Gray. Gray, former PWA housing division head, has been promoted by Ickes to the job of assistant administrator of public works since the Straus appointment. Straus will look for further guidance to the local housing authorities, charged under the law with initiation, construction and management of the projects.

He expects to take over the new job on Nov. 1. He has been given jurisdiction over 51 PWA low-cost housing projects of which 21 have been completed. The balance is to be completed by July, 1938, and PWA has been allotted $134,000,000 for the work. The 51 projects will provide 21,800 housing units, for which 85,000 applications have been received.

This, of course, is in addition to the program called for under the new housing act, which provides for Federal loans and rental subsidies to municipal housing projects.

Compiled in the style of picture-story magazines using action photographs, a 115-page booklet covering the story of steel from iron ore mining to pouring of ingots and cutting of billets has just been issued by Youngstown Sheet & Tube Co.'s sales promotion department.

"The What-Why & How" of Cleaning Metals

The Chemical Engineers who direct the manufacture of the various metal cleaners bearing the Wyandotte brand play no favorites in weighing these questions. Nor do our Research Chemists.

But long experience amply justifies the chief interest of consumers in "HOW".

"How fast does a Wyandotte cleaner produce metal surfaces chemically clean?"

"How does the use of Wyandotte affect my cost of cleaning?"

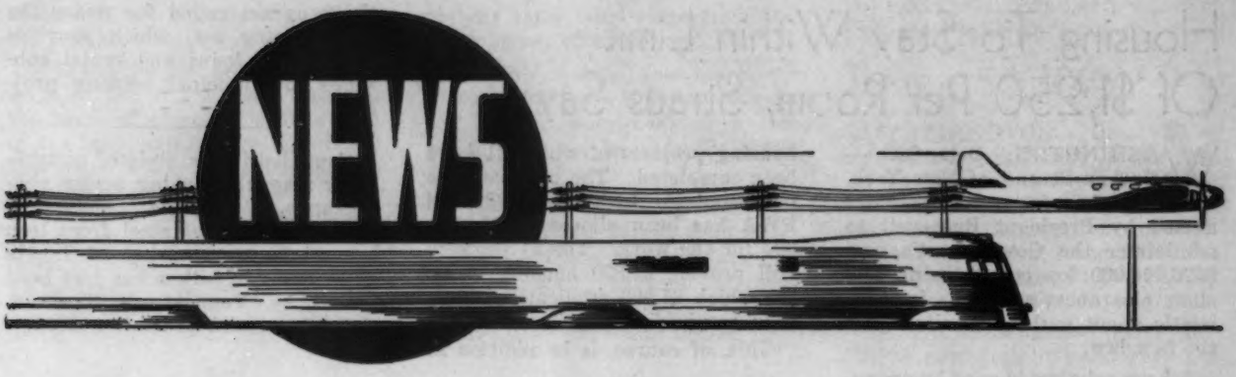
"How does Wyandotte reduce hazards in production?"

It is our constant aim to answer such questions, not in laboratory terms, but by handling a tough job to your satisfaction.

May we co-operate with you, too?

THE J. B. FORD CO. WYANDOTTE, MICH.

METAL SURFACES chemically clean



Hardware Manufacturers and Jobbers Discuss Problems at Chicago Meeting

MANUFACTURER and jobber relationships, other problems of the trade, and economic questions confronting the nation as a whole were discussed at the joint convention of the National Hardware Manufacturers Association and National Wholesale Hardware Association, held last week at the Palmer House, Chicago. Registration totaled over 1400 while total attendance was estimated at more than 2000.

The two associations held separate meetings during most of the convention period, those of the hardware manufacturers being mostly concerned with business and economic problems. Following the opening address by Robert G. Thompson, president of the association, Walter R. Peabody, associate professor of economics, Rutgers University, voiced his disapproval of the reciprocal tariff policy now being followed in Washington, and urged the stabilization of foreign exchange so that this country may be free from unrest and internal dissension among countries in Europe and the Far East.

Sees No Depression Ahead

Henry H. Heiman, executive manager, National Association of Credit Men, New York, could see no depression in sight, and said that the large farm income this year, high prices paid to labor, large return on capital and industry, and easy credit were factors working against such an occurrence. He predicted slow business for the remainder of this year, however, and thinks that business in the first six months of 1938 will be less than the same period this year, although in the second half next year it will be on a rising trend. A balanced budget, a solution of our labor problems, and the elimination of credit abuses will do much toward bringing about prosperity, in Mr. Heiman's opinion, as he believes that the Government is now mortgaging its future credit position.

In discussing the "Wage, Hour and Price Problem," Dr. Harold G. Moulton, president, Brookings Institution, Washington, stated that the "primary need . . . is an increase in the total volume of national production," rather than further reductions in working hours as is being advocated by the Government. "No matter how much we increase money wages," Dr. Moulton continued, "if the volume of goods available for purchase remains stationary, real standards of living will not be raised. A shortening of hours may be a means of absorbing some of the unemployed, but if increasing production does not result there will be no increase of goods and services available for consumption."

Rising costs in production brought about by wage increases and reductions in working hours have "undoubtedly been a major

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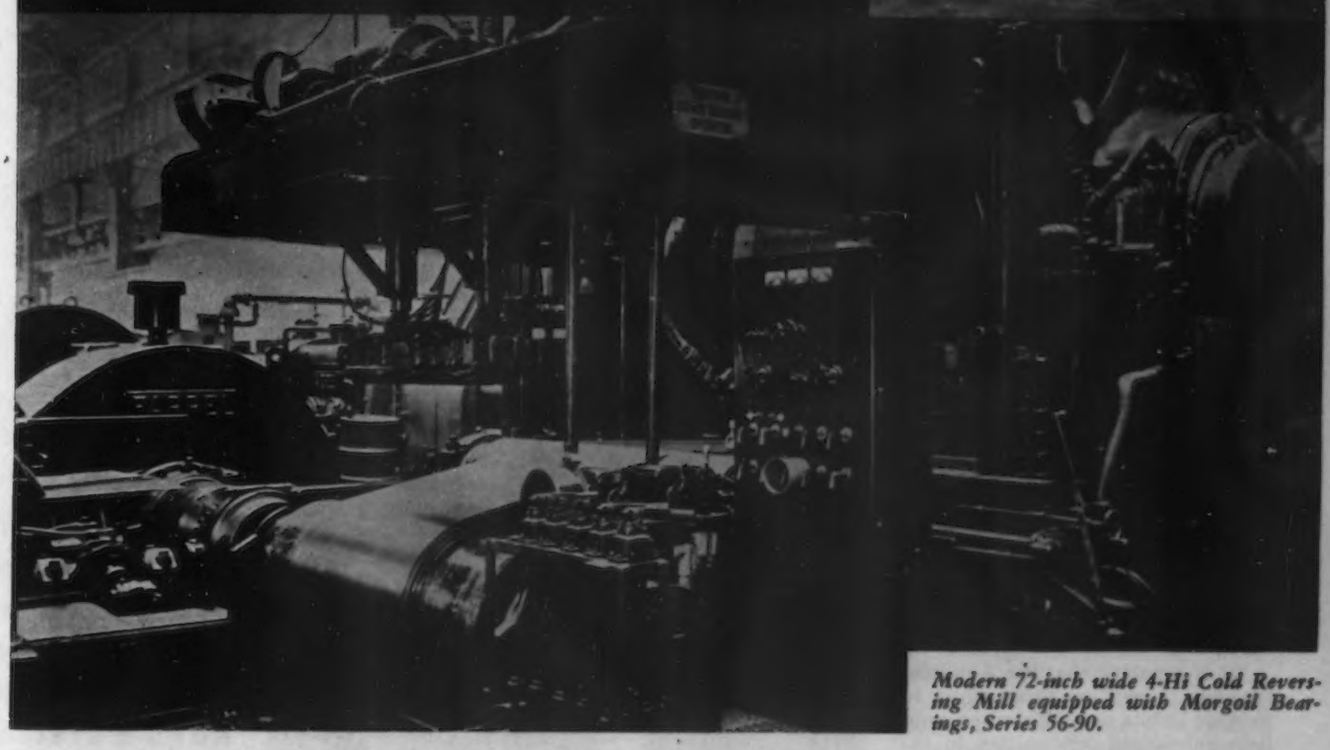
PROVED *Performance*
Positive Maintenance
POWER *Savings*
Precision



Modern 72-inch wide 4-Hi Cold Reversing Mill equipped with Morgoil Bearings, Series 56-90.

Bearings on modern rolling mills must not only be good—they must stay good. Long life with freedom from trouble is absolutely demanded. Accuracy of product is essential, of course. Power savings and low maintenance costs are increasingly important factors. To all these specifications the answer is Morgoil.

Actual service has proved the unsurpassed efficiency of Morgoil Roll Neck Bearings beyond all question. Their wide acceptance by the Rolling Mill industry is the best evidence of highly satisfactory performance in their many applications. They are a typical Morgan development—the product of sound engineering design and constructive skill.

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R-30

Morgoil MORGAN WORCESTER ENGINEERS AND MANUFACTURERS *Bearings*

factor in the current business recession," said Dr. Moulton. "Increases in wages depend upon increasing efficiency . . . but an improvement in the ratio of wages to prices depends fundamentally upon increasing efficiency. Between 1934 and the end of 1936 wages were increasing relatively to prices, an improvement made possible by the gradual increase in productive efficiency that was occurring. Since the beginning of 1937, however, the sharp advance in wages has been unrelated to efficiency; and dislocations have been the inevitable result."

Champions Robinson-Patman Act

The rights of the independent jobbers were championed in an address on "Price Discrimination and Price Maintenance," by Congressman Wright Patman, Texas. The Robinson-Patman Act is being regarded favorably, he continued, and "is having the beneficial effects that had been predicted by its sponsors. . . . The act has been so effective and such a wholesome influence that many of the big chiselers are falling into line and many of the smaller ones are being pushed into line."

After discussing the workings of the Robinson-Patman Act and the Tydings-Miller Act, Representative Patman said that new anti-trust legislation may include a limitation on the percentage of control any one company can exert over any one industry, Federal licensing of interstate corporations, with licenses to be denied to concerns using monopolistic practices. He added:

"It is reported that the Administration . . . will make an effort to provide public competition or publicly subsidized competition in industries where private competition fails. This proposal should be carefully watched in order that innocent industries that are not monopolistic in character may not be burdened with subsidized competition."

The following officers were elected for 1938: President, Robert G. Thompson, Lufkin Rule Co., Saginaw, Mich.; vice-presidents, H. B. Wilson, Mathias Klein & Sons, Chicago; Houston Dudley, Gray & Dudley Co., Nashville, Tenn.; Richard Harte, Ames Baldwin Wyoming Co., Parkersburg, W. Va.

Metal Branch Meeting

At the meeting of the metal branch of the National Wholesale Hardware Association action now being taken to widen the distribution of terne plate was discussed by George E. Totten, manager of tin plate sales, Carnegie-Illinois Steel Corp., Pittsburgh, who said that the greatest potential market for roofing ternes was composed of the property owner, architect and builder. For this reason, Mr. Totten said that the product should be identified with really fine homes, and that advertising was being placed in architectural magazines.

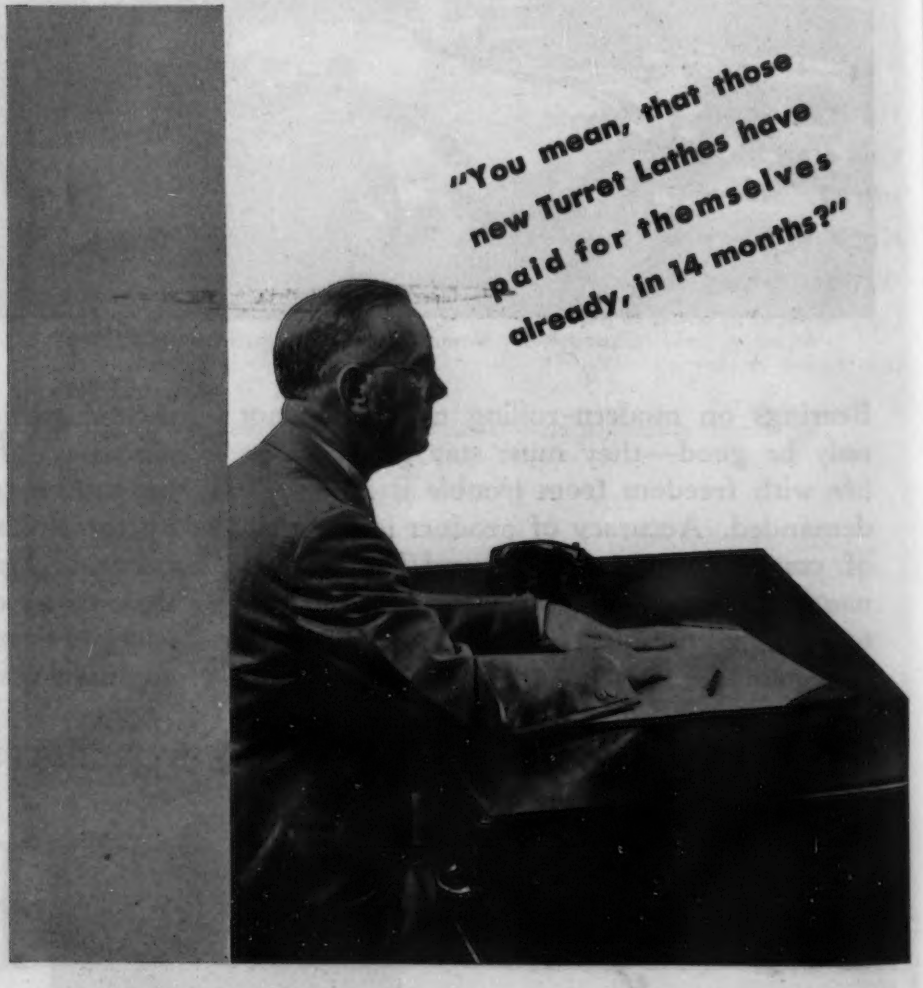
The tin and terne plate committee, through its chairman, O. F. Murphy, Lyon, Conklin & Co., Inc., Baltimore, announced the adoption of a standard roll terne for roofing purposes, to consist of 28 sheets, each 20 by 28 in., four rolls to the box. For valleys and other purposes, each roll should be 100 ft. long, or 50 ft. long, and shall be termed a roll of terne. Since 70 per cent of the members of the association have approved these revised data, the specifications will go into effect Nov. 1, 1937, and will be listed as Simplified Practice Recommendation R30-37, Roofing Terne. Mr. Murphy also urged that the quantity extras charged a roll by the manufacturers who fabricate ternes in rolls, should be increased. He stated further that a 23 per cent advance in sales over 1936 figures had been enjoyed by sellers of roofing ternes, but added that since the recent price advance a 32 per cent decrease has been recorded.

That the mills should handle all carload orders and the jobbers the l.c.l. business was a point brought out in a paper written by Frank R. Meyer, Jr., vice-president, Inland Steel Co., in a discussion of the mills' problems in distributing flat and corrugated sheets. The production of these items during 1936 amounted to 1,500,000 tons, said Mr. Meyer, and 524,000 tons was sold to jobbers and distributers.

A. J. Becker, Ohio Valley Hardware & Roofing Co., Evansville, Ind., in his report as chairman of the galvanized and black sheet and corrugated roofing committee, made recommendations which resulted in the passing of a resolution to the effect that the functional differential received by jobbers on all sheets sold to them by a mill be continued. The present discount is $2 a ton.

Surplus Tax Modification Favored

Resolutions were passed at the business meeting of the association favoring the modification of the



undistributed profits tax; objecting to the pricing of merchandise by manufacturers on a quantity basis without recognition of the wholesalers' function; and urging the allowence of a 2 per cent cash discount to wholesalers of hardware by manufacturers.

All of the 1937 officers and members of the advisory board and executice committee were re-elected to office for the 1938 term. The officers are as follows: President, Shannon Crandall, California Hardware Co., Los Angeles; and vice-presidents, Mark Lyons, McGowin-Lyons Hardware & Supply Co., Mobile, Ala.; Glenn E. Jennings, Wright & Wilhelmy Co., Omaha, and A. W. Howe, J. M. & L. A. Osborn Co., Cleveland. A. J. Bihler, Pittsburgh, was elected an honorary life member.

Ferro Enamel Corp., Cleveland, has established four new scholarships to begin this fall at Case School of Applied Science, University of Illinois, Ohio State University and Alfred University. Students obtaining the scholarships will carry on research in enameling.

Steel Industry Payrolls Gained Faster Than Production In 1937

STEEL payrolls during 1937 increased at a faster rate than steel output, following a four-year period when the payrolls and output were closely related, according to a study by the American Iron and Steel Institute.

The step-up in the payroll increase came in March of this year when an average wage advance of 18 per cent became effective.

From September, 1933, until March of this year monthly changes in the volume of wages and output were in close correlation, the spread between the charted record of dollar volume of total wages paid and the volume of steel output averaging less than 8.5 points.

Spread Increases

Since the pay rise in March of this year, monthly payrolls have continued to reflect fluctuations in the volume of production, but charts show that the spread between payrolls and production has averaged nearly six times as much as the average spread in preceding months.

In August, the most recent month for which steel payroll data are available, a total of $77,570,000 was paid to wage-earning employees, or more than 160 per cent above the total of $29,608,000 paid out in wages in September, 1933. Over that 48-month period, output of steel ingots increased only 113 per cent, rising from 2,283,079 gross tons in September, 1933, to 4,875,671 gross tons in August, 1937. A sharp increase since 1933 in the amount of wages paid per ton of ingots produced is indicated by these figures.

Workers employed in August totaled 541,000, most in the history of the industry, and about 42 per cent above September 1933 when 380,000 wage earners were at work.

Fewer Salaried Workers

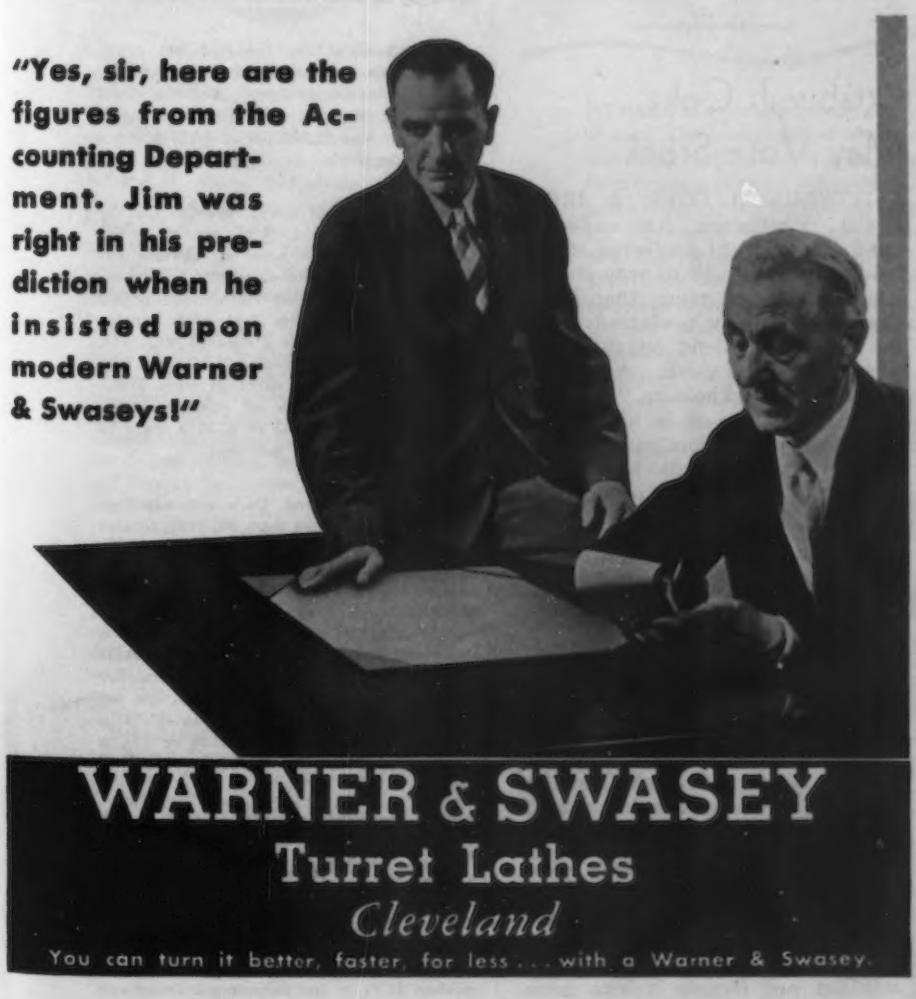
Steel companies employ nearly twice as many wage earners per salaried employee as do all other manufacturing industries in the aggregate, according to the institute analysis in the latest Federal Census of Manufacturers. Twelve wage earners worked in the steel industry in 1935 for each white collared salaried employee, which compares with a ration of 6.8 to one in the case of all other industries.

Similarly the steel industry paid $5.95 in wages per dollar of salaries against an average for all other industries of $3.20.

Recent reports to the American Iron and Steel Institute indicate that 300,000 wage-earning steel workers were granted vacations with pay during 1937. In the vacation season of 1936, vacations with pay were granted to about 190,000 workers in companies employing about 80 per cent of the steel workers.

Added payroll cost arising from steel vacation plans is estimated at $12,000,000 for 1937 and $7,000,000 for 1936. Additional companies have adopted vacation plans for 1938.

Athenia Steel Co., Clifton, N. J., has announced that its present prices on cold rolled spring steel have been reaffirmed for the first quarter.


"Yes, sir, here are the figures from the Accounting Department. Jim was right in his prediction when he insisted upon modern Warner & Swaseys!"
WARNER & SWASEY
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You can turn it better, faster, for less . . . with a Warner & Swasey.

ATLAS CARS

Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

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Electric Transfer Cars for Blast Furnaces and Steel Plants

Stockhouse Scale Cars for Blast Furnaces

Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose

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1140 Ivanhoe Rd., Cleveland, O.

Sheet & Tube Profits $3,586,495 in Quarter

YOUNGSTOWN SHEET & TUBE CO. earned $3,586,495 during the third quarter compared with $2,022,112 in the second quarter. Earnings for the first nine months amounted to $10,494,627 compared with $6,845,386 for the first nine months last year. These earnings are without deduction for Federal surtax on undistributed profits.

At a stockholders meeting Oct. 19 common shareholders approved an increase in the authorized common shares from 2,000,000 to 2,500,000 shares and the release of preemptive rights of common shareholders on not exceeding 400,000 common shares and granted authorization to the directors for the issuance of securities convertible into common shares.

This action was taken to place the company in position to undertake new financing when the directors may consider such action advisable. This financing would be to provide funds for new equipment and plant betterment, to add to working capital and pay off bank loans.

Pittsburgh Coke May Vote Stock

PITTSBURGH COKE & IRON CO., Pittsburgh, has called a special meeting of preferred stockholders for Nov. 18 to vote on the issuance of not more than 7500 shares of similar preferred stock as a stock dividend on the company's common stock. According to advice to stockholders, "the management believes it is highly important to stockholders that the distribution of profit be accomplished in some form other than cash."

While no meeting is required the common stockholders were advised that "no final action has been taken with regard to the payment of dividends this year on the common stock and the taking of any action by the board is dependent on business conditions during the remainder of the year."

J. L. Hillman, Jr., president, in a letter to the stockholders, said that:

"On the basis of present estimates of earnings for the full year the company will become obligated to pay a surtax of approximately $150,000 to $175,000 on its undistributed net income unless some dividend is paid during the year on the common stock. . . . It is the present view of management that a dividend of from 6000 to 7000 shares of preferred stock should be paid on the common stock this year."

FINANCIAL NOTES

Otis Steel Co. earned $948,285 during the third quarter of 1937, after all charges and provision for estimated Federal normal income tax, as compared with earnings of $495,109 for the same period last year. Earnings for the first nine months of this year were $2,691,105 as compared with $1,395,459 for the same period last year. The Otis company last week declared a dividend of $1.37½ per share on its convertible first preferred stock for the quarter ending Dec. 15 and a dividend of $43.75 on its prior preference stock payable Nov. 15. This payment will satisfy all dividends accrued on this stock. The directors also authorized the redemption of prior preference stock at $111.75 per share, being 110 per cent of par plus dividend for the last quarter.

Dow Chemical Co. reported net profit for the three months ended Aug. 31, 1937, of $1.42 a common share. For the fiscal year ended May 31, 1937, net profit after all charges was $4,089,113 or $4.15 a share on common stock.

Continental Steel Corp. reported for the three months ended Sept. 30, 1937, net earnings of $258,890 after all charges but before the undistributed profits tax, compared with $71,842 for the similar period of 1936. Net for the September quarter equalled $1.08 a share compared with 14c. in the similar 1936 period. For the first nine months of 1937 earnings were $793,512, or $3.31 a share of common stock, compared with $397,461 or $1.31 a share in the similar period of last year.

Cleveland-Cliff Iron Co.'s net earnings for the quarter ended Sept. 30, 1937, totaled $2,231,803 after interest, depletion, taxes, etc., equal, after preferred dividend requirements, to $3.97 a common share. This compares with net earnings in the second quarter of $1,771,345 or $2.84 a share and a net profit in the third quarter of 1936 of $1,437,757 or $2.03 a share. For nine months ended Sept. 20, 1937, the net profit was $4,104,171, equal to $5.58 a share, compared with $2,022,196 or 47c. a common share in the similar period of 1936.

Union Carbide & Carbon Corp. reports for the nine months ended Sept. 30, 1937, net earnings of $30,465,886, equal to $3.38 a share, compared with $23,550,950, or $2.61 a share, in the like period of 1936. The company's net profit for the quarter ended Sept. 30, equalled $1.11 a share against $1.17 in the preceding quarter and

90c. a share in the September period of 1936.

American Forging & Socket Co. reports net earnings of $382,437 after all deductions, including the undistributed profits tax, for the year ended Aug. 31, 1937. This is equal to $1.65 per share on 231,400 common shares outstanding.

Standard Steel Spring Co., Pittsburgh, declared an initial dividend of 50c. on new common stock, payable Nov. 26 to record Nov. 13. The last previous payment was $1 on the old stock in August before a 100 per cent stock dividend was paid. Net earnings for the first nine months before surtax were announced as $393,800, were equal to $1.97 a share on the new stock.

Interlake Iron Corp. reported for the September quarter a net profit of $837,371 after depreciation, interest, taxes, etc., against $99,311 in the similar period of 1936.

Baldwin Locomotive Works and subsidiary companies, including The Midvale Co., reported orders taken in September of $1,673,241 as compared with $2,532,734 in September, 1936. Bookings for the Baldwin companies in the first nine months of 1937 totaled $27,905,527 compared with $23,902,050 in the same period of 1936.

. . TRADE NOTES . .

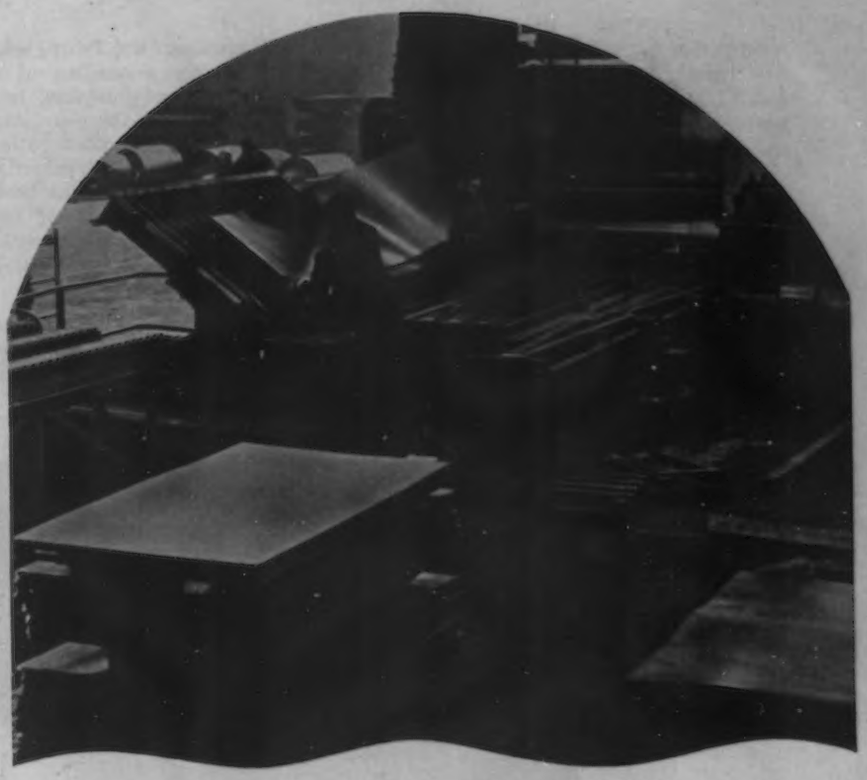
Homestead Valve Mfg. Co., Coraopolis, Pa., announces five new distributers of Hypressure Jenny, a steam vapor spray cleaner. They are The Gibson Co., 433 North Capital, Indianapolis; Dyke Motor Supply of Akron, 372 South Broadway, Akron, Ohio; Canton Hardware Co., 122 Third, N.W., Canton, Ohio; The Keyes Co., 115 West Fifth, East Liverpool, Ohio, and Minneapolis Iron Stores Co., 512 North Washington, Minneapolis.

R. L. Johnstone, 1407 North Hanley Road, St. Louis, has been appointed to represent Graham Transmissions, Milwaukee, manufacturers of the Graham variable speed transmission. Other new representatives appointed are Charles C. Grant, 436 Second National Building, Akron, Ohio, and George P. Coulter, 322 Curtis Building, Detroit.

Northern Equipment Co., Erie, Pa., announces appointment of Cochrane Steam Specialty Co., 80 Federal Street, Boston, as New England representative for sales and service of Copes feed water regulators, differential valves, pump governors, reducing valves, Desuperheaters and allied equipment.

Detroit Rex Products Co., Detroit, maker of Detrex Degreasing machines, Perm-A-Clor and Triad solvents, and Triad Alkali cleaners and strippers, has opened a branch office in the Provident Bank Building, Cincinnati, to serve the lower Ohio, lower Indiana and northern Kentucky areas. A warehouse will be opened at Lockland, Ohio.

Standard Tube Co. has transferred its offices from 14520 Oakland Avenue to 14534 Woodward Avenue, Detroit.



STEEL FACES MORE HANDLING AND PROCESSING PER TON

STEEL rails and structural shapes, once the backbone of the steel industry, will never regain their former tonnage ratio. All authorities agree that the future will see steadily increasing tonnage in sheets and lighter forms, and most of them look forward to great developments in building construction as the next source of greatly increased demand.

All of this means that the steel industry seems definitely headed for more processing and for more application of the Continuous Flow Principle of Handling Materials.

Mathews engineers are designing equipment today that will be adequate tomorrow. Mathews systems for the Steel Industry have always been competently engineered in the broadest sense. They include every type to meet every specialized requirement.

Processing Equipment installed during 1936-37, embracing the ultimate in design and engineering in the Steel Industry, is illustrated and described in our catalog on Steel Plant Conveyers. Available now.

The leaders in this industry, responsible for 85% of steel production in the United States and Canada, are applying the Continuous Flow Principle of Handling Materials.

MATHEWS CONVEYER COMPANY

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MATHEWS

CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

CONVEYERS

..PERSONALS..

CARL W. MEYERS, assistant district manager Central Alloy district of Republic Steel Corp., has been promoted to the position of district manager, succeeding E. A. PORTZ. The district includes Canton and Massillon. Mr. Portz, who has spent nearly a quarter of a century in the steel business, has been ill since early in the year, and will be assigned home office duties as soon as his health permits. FRANK C. FARRELL, who has been assistant district manager of the Warren district, will be transferred to Massillon to succeed Mr. Meyers as assistant district manager.

Mr. Meyers became associated with the Upper works of the Carnegie Steel Co. in Youngstown in 1907 and in 1918 went with the McDonald mill, Youngstown, where he remained until 1931, serving the last eight years as superintendent. In 1931 he joined the Republic Steel Corp. as superintendent of the rolling mill in Chicago, and in 1933 was transferred to Youngstown. In 1934 he was made assistant district manager of the Central Alloy district.

Mr. Portz has been with Republic and its predecessor companies since his graduation from Ohio State University in 1913. He started as assistant chemist with the United Steel Co., Canton, in that year, became general superintendent of the Central Alloy Steel Co. in 1926 and district manager for Republic Steel Corp. in 1930.

C. W. MEYERS

Mr. Farrell started in the steel business in 1903 as a water boy in what is now a Carnegie-Illinois plant in Youngstown. Later he became turn foreman in its bessemer plant. In 1909 he became associated with Youngstown Sheet & Tube Co. in the same capacity and remained with that company until 1928. At that time he was district manager. In 1928 he was made assistant general manager of Steel & Tubes, Inc., Cleveland, and following its merger with Republic was transferred to Warren in 1930 and placed in charge of the steel works. Last May he was made assistant manager of the Warren district.

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CHARLES P. BETZ will be superintendent of the new coke plant being erected by Hanna Furnace division of the Great Lakes Steel Corp., Ecorse, Mich., when it is placed in operation Jan. 1. He is a graduate of Case School of Applied Science, Cleveland, and was associated with American Steel & Wire Co., Central Furnaces divi-

● *Ajax has set up its Upsetters*

For Most Accurate Forging and Coining

Outstanding features of Ajax Upsetting Forging Machines have been built into this full line of high speed, heavy duty Forging and Coining Presses.

● ONE-PIECE, SOLID STEEL FRAME, of ample cross section for extremely low stresses and negligible elongation at full rated tonnage, results in close tolerance forgings.

● SOLID SLEEVE CRANKSHAFT BEARINGS in integral frame housings provide rigid support for the full-eccentric crankshaft and prevent deflection of this important member.

● REAR EXTENSION GUIDED SLIDE has the advantages of great guided length and perfect die match at the same time affords full accessibility to the pitman.

● ROLLED STEEL PITMAN, flame-cut from special analysis rolled billet with wrist pin augmented by thrust shoe bearing for outside pitman end.

● AJAX PATENTED DIRECT AIR OPERATED FRICTION CLUTCH gives instantaneous treadle response and smooth cushioned starting action at operating speed heretofore regarded as impossible.

IN CAPACITIES FROM 500 TO 2000 TONS

THE AJAX MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND

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sion, until 1916. Then he became active with the coke oven department of Youngstown Sheet & Tube Co., Youngstown, continuing there until 1926, when he became superintendent of the coke plant at the Central Alloy plant of Republic Iron & Steel Co., Massillon, Ohio, later the Central Alloy division of Republic Steel Corp.

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H. S. SCHULER has been appointed division manager of industry advertising of the Westinghouse Electric & Mfg. Co., East Pittsburgh. Mr. Schuler went to Westinghouse from the advertising agency of Ketchum, MacLeod & Grove, Inc., Pittsburgh, where he was an account executive. Other division advertising managers appointed were T. H. CABLE and J. H. THOMSON.

H. S. SCHULER

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A. J. ACKERMAN has been appointed development engineer for the engineering works division and the contracting division of Dravo Corp., Pittsburgh. Mr. Ackerman was graduated from the University of Wisconsin in the electrical and civil engineering courses. He was previously associated with Stone & Webster on Conowingo Dam and with W. E. Callahan Construction Co. on the Madden Dam, Panama. For the last four years, he has been the head construction plant engineer for the Tennessee Valley Authority.

Mr. Ackerman holds patents on automatic spillway gate operating mechanisms as used on the Calderwood, Glen Ferris, and Bonneville Dams; and also on the cableway towers with rear thrust wheels as used on the Madden, Marshall Ford, Norris, Boulder, and Bonneville Dams. He is co-author with C. H. Locher of the book published serially "Planning and Plant for Heavy Construction."

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JOHN R. LOTZ, associated with the Stone & Webster Engineering Corp. for 30 years and for the past seven years executive vice-president, has been made president, succeeding JAMES H. MANNING.

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WHITING WILLIAMS, industrial consultant, author and lecturer, Cleveland, will be guest speaker on Nov. 2 at a joint meeting of the Milwaukee chapter, American Foundrymen's Association; Milwaukee branch, National Metal Trades Association, and Milwaukee Employers' Association, at the Schroeder Hotel. Wisconsin manufacturers and other business men generally have been invited to attend. Mr. Williams will speak on "What Do Men and Managers Want of Each Other."

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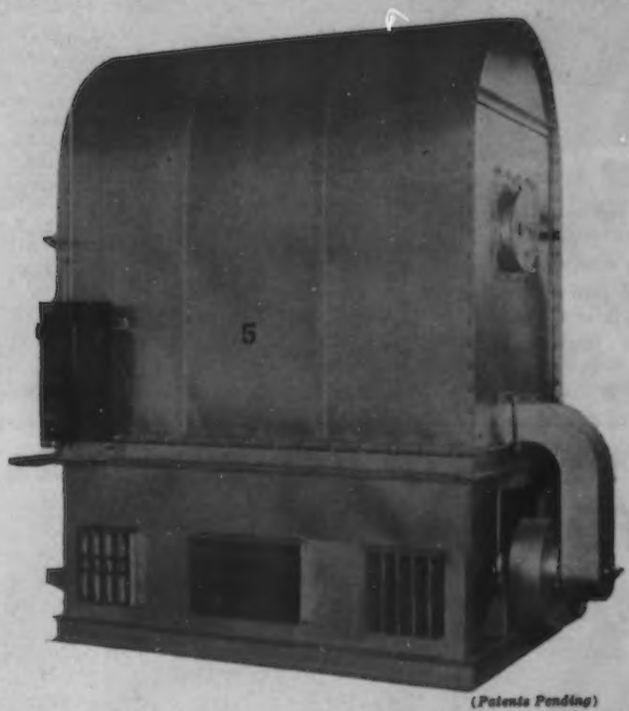
HOWARD J. KAIGHIN has been made president and treasurer of



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PIPE YOUR FUEL—NOT YOUR HEAT

In large open areas within buildings, modern heating practice puts the warmth where needed, through the many-featured facilities of LEE DIRECT FIRED WARM AIR UNIT HEATER.

Lee generates heat ***on the spot***—from oil, gas, coal or coke with efficiencies as high, with heavy fuel oil, as 88%.

Installations of Lee Units cost less initially, operate cheaper annually, give heat immediately in spotty weather. They distribute that heat from the ***floor up***, broadcast or localized, as desired.

In all, they provide the most flexible method for high output, low cost heat generation now available.

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CONE, FLAT
AND DOG
Points

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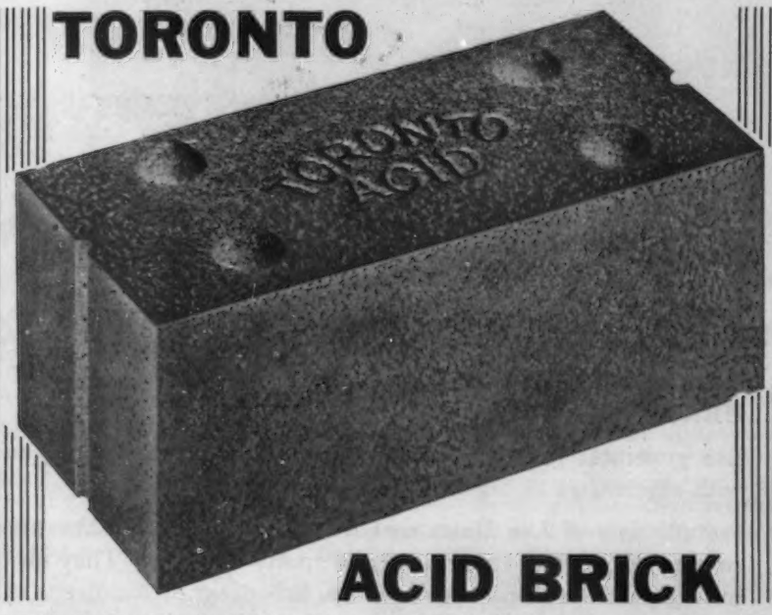
SET SCREWS • BOLTS AND NUTS

THE BRICK TO USE WITH BASOLIT

TORONTO



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IMPERVIOUS TO ANY ACID ACTION

Toronto Acid Brick and Basolit, the acid-proof cement joint, go together like bread and butter . . . because Toronto repressed, deaerated Acid Brick are designed especially for use with Basolit to make tank walls and floors impervious to any acid action. Accurately molded in stock and special shapes . . . laid up at lower labor cost. Write for free sample and full facts.

THE KEAGLER BRICK COMPANY
STEUBENVILLE, OHIO

Fire Clay, Acid Resistant Brick, Fire Clay Mill Brick, Pickling Tank Linings, Acid Proof Construction, Paving Brick, Paving Block, Chimney Stack Brick

the American Welding & Mfg. Co., Warren, Ohio.

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EDWARD I. EVANS, assistant district manager for the Buffalo district, Republic Steel Corp., Cleveland, has been promoted to general superintendent of the Gulf-steel district, with headquarters at Gadsden, Ala. He started his steel career in his native city of Glasgow, Scotland, at the age of 12. He came to the United States in 1907 and became associated with the Worth Steel Co. at Coatesville, working in the open-hearth department. In 1915 he joined the Duluth plant of the United States Steel Corp., and the following year returned to the Worth Steel Co. as assistant bolt and nut superintendent and later becoming open-hearth superintendent. He joined the Bourne-Fuller Co., Cleveland, as general manager in 1929 and three years later was made assistant manager of the Canton district for Republic Steel Corp. His next move was to Buffalo in 1934, where he held the position of assistant district manager.

E. I. EVENS

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CHARLES H. BRADLEY has become associated with the Wellman Engineering Co., Cleveland, as sales engineer. He is well known in the steel industry, having held important engineering positions with companies that design and manufacture steel plant equipment, and with various steel plants. Early in his engineering career he was employed by Heyl & Patterson, Pittsburgh, and later by the National Tube Co., McKeesport, Pa., Tennessee Coal, Iron & Railroad Co., Perin & Marshall, and by Otis Steel Co., Cleveland. He served as chief engineer of the former Variety Iron Works, Cleveland, and for some time had charge of the industrial division of the American Shipbuilding Co., Cleveland, han-

C. H. BRADLEY

dling blast furnace steel plant, sintering plant, heavy plate and machine work. Recently he has been in the employ of the engineering department of Republic Steel Corp.

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LOUIS F. POOCK, vice-president and general manager of Sheffield Gage Corp. and the Cimatool Co., Dayton, Ohio, has been elected chairman of the Dayton-Columbus-Cincinnati section, Society of Automotive Engineers. He will be assisted during the 1937-38 season by W. W. TANGEMAN, vice-president, Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, vice-chairman; K. W. STINSON, professor of automotive engineering, Ohio State University, Columbus, Ohio, vice-chairman; E. S. PATCH, chief engineer and sales manager, Moraine Products Division of General Motors Corp., Dayton, treasurer; WILLIAM S. WOLFRAM, engineer, Inland Mfg. Division of General Motors Corp., Dayton, secretary. The advisory board will consist of J. H. DAVIS, general manager, Moraine Products Division of General Motors; A. R.

L. F. POOCK

THERE'S A NEW CROP COMING
IF WE CAN'T GROW HAIR, WE'LL HIRE IT AND PLANT BENEATH IT ALL THE SPRING KNOWLEDGE WE POSSESS—SO THAT YOU MAY ALWAYS HAVE GOOD SPRINGS*

DUNBAR SPRINGS

SEND YOUR SPRINGQUIRIES TO

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STEEL SHEETS

Continental sheets, both black and coated, have long been favored by users for uniformity of gauge and temper. These sheets are supplied in special-analysis open hearth steel, both commercial and copper-bearing. They are finished in hot rolled, hot rolled annealed, cold rolled; special and uniform blue, pickled, deoxidized, galvanized.

OPEN HEARTH STEEL

Wire: Bright Basic, Annealed, *Konik, Special Manufacturers, Galvanized, *Flame-Sealed.
Wire Rods, Nails, Staples, Bale Ties, Barbed Wire; Fence—15 Types; Gates and Fittings.
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*Trade Mark Reg. U. S. Pat. Office.

CONTINENTAL STEEL CORP.
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Plants at Canton, Kokomo and Indianapolis

CONTINENTAL
SHEET STEEL AND WIRE PRODUCTS

FORS, works manager, Airtemp, Inc., Dayton; C. H. KINDL, general manager, Delco Products Division of General Motors, Dayton; H. A. MACK, divisional manager, Ethyl Gasoline Corp., Dayton; J. A. MCMILLAN, chairman of board, the Dayton Rubber Mfg. Co., Dayton; E. B. NEWILL, assistant general manager, Frigidaire Division of General Motors, Dayton.

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W. J. WESTPHALEN, vice-president and general manager of the Laclede Christy Clay Products Co., St. Louis, has been elected president of the American Refractories Institute.

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LAURIN D. WOODWORTH has been appointed chief metallurgist of the Youngstown district plants of Carnegie-Illinois Steel Corp., Pittsburgh. He was formerly a foreman of the metallurgical observation corps at Youngstown. He began his career with the Pennsylvania Geologic Survey in 1921 and entered the steel industry a year later as a metallurgist. In 1927 Mr. Woodworth joined Carnegie Steel Co. at the Youngstown metallurgical department. He has also been connected with open-hearth melting practice under supervision of the U. S. Bureau of Mines.

PHILIP SCHANE, JR., has been appointed chief metallurgist of the Duquesne steel works of Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Schane, who was chief metallurgist at Duquesne from 1932 until 1936, when he went to Youngstown in the same capacity, succeeds JAMES A. OGILVIE, who is no longer with the company. Mr. Schane was graduated from Carnegie Institute of Technology in 1926 and has been in the employ of Carnegie-Illinois since 1911.

WILLIAM J. KELLY, new president of the Machinery and Allied Products Institute, Chicago, as reported in these columns last week.

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J. A. SCHALLENBERG, who has been identified with the Worthington Pump & Machinery Corp., Harrison, N. J., for the past 20 years, has been appointed assistant comptroller.

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FRANK FIELDS has been made general manager of the Sidney Machine Tool Co., Sidney, Ohio, succeeding A. C. GETZ. Mr. Getz has been made vice-president and will continue to be active with the company in that capacity.

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E. G. BAILEY, vice-president of the Babcock & Wilcox Co., New York, and president of the Bailey Meter Co., Cleveland, has been given the honorary degree of Doctor of Engineering by Lehigh University for "notable and distinguished accomplishment in the field of combustion and steam engineering."

SUPER-SERVICE RADIALS

The First Three Led To 12 More High-Speed Super-Service Radials

• These views show a few of the 15 High-Speed, All-Geared Super-Service Radials recently installed by a nationally-known manufacturer, whose work includes a variety of jobs like the one shown in the center photograph. Operations in sequence are as follows: Drilling —six 9/16", seven 13/32", one 7/16", one 3/8", one 15/16", one 29/64", one 21/64", one 3/16", one 1/2", one 1/4", two 1/8"—23 HOLES PER PIECE IN ELEVEN DIFFERENT SIZES.

In addition, eight holes are tapped. Ability to change over quickly in order to handle a wide range of hole sizes economically on Super-Service Radials makes their use particularly advantageous. Their speed and ease of handling will inspire your operators.

Ask our engineers to show you all the benefits of these modern machines.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY, CINCINNATI, OHIO

CINCINNATI BICKFORD

...OBITUARY...

D. ANTHONY USINA, general patent attorney of the United States Steel Corp., New York, died at his home at Nutley, N. J., Oct. 22, aged 67 years. After practicing civil engineering for a few years early in his career, he became an examiner of patents in the patent office at Washington. In 1900 he engaged in practice as a patent lawyer and 10 years later was appointed assistant patent counsel of U. S. Steel. He continued in that capacity until 1916, when he was appointed general patent attorney.

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WALTER F. BRINK, vice-president of the Engineering Specialties Corp., died in a Detroit hospital after an illness of eight weeks. He was born in Detroit 37 years ago, and before going with the Engineering Specialties Corp., was an officer of the D X L Radio Corp.

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HARRY A. CLUM, founder and for many years president of the Clum Mfg. Co., Milwaukee, specializing in light automotive stampings, locks, and switches, died on Oct. 18, aged 72 years. He was born in Appleton, Wis., and in 1900 entered the engineering department of the Allis-Chalmers Mfg. Co., Milwaukee, retiring in 1912 to establish his own business. In recent years he had been a consultant in engineering to the Clum firm.

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ROBERT A. CARNAHAN, for the past two years Pittsburgh representative in charge of acid tank installation for the Nukem Products Corp., Buffalo, died on Oct. 19 at Douglas, Ariz., where he had gone for his health. He was 34 years old and was a graduate of Ohio State University.

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WILLIAM R. SWEATT, chairman of the board of the Minneapolis-Honeywell Regulator Co., Minneapolis, died on Oct. 12.

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ROBERT H. MOON, who founded the Moon Foundry and the Moon Pattern Co., from which he retired four years ago because of ill health, died at his home in St. Louis. He was born in that city 91 years ago. For a long time he was associated with his father in the Moon Elevator Co.

18 U. S. Vessels Sold For Scrap

WASHINGTON, Oct. 22.—Approximately 56,000 tons of scrap will be salvaged from 18 obsolete vessels of the Government's laid-up fleet which have been sold to successful bidders by the Maritime Commission.

Simpson, Spence & Young, New York, were successful bidders on 10 of the ships for which they bid $381,700. The ships may be scrapped either in this country or abroad and are estimated to yield a total of 30,000 tons of scrap.

Scrap To Be Recovered

Union Shipbuilding Co., Baltimore, the successful bidder on four ships, bid $106,275 and agreed to scrap only in American yards. Scrap tonnage is estimated at 11,000 tons for these four vessels.

Hyman-Michaels Co., Chicago,

Central

Open-Hearth

Sheared and Universal

STEEL PLATES

- A sincere effort is made by the officials of this Company to give individual attention to every customer's order.
- We try to execute your order as faithfully as one of the foremen in your own plant would do it.
- Hundreds of repeat orders prove the success of this policy.
- May we demonstrate how it can be applied to your requirements?

CENTRAL *Quality Products*

Sheared and Universal Plates—Forging Billets
Slabs—Blue Annealed Sheets
Flanged and Dished Heads—Steel Stampings

ROLLED STEEL FLOOR PLATES

"All-Way-Grip" "Knobby"
"Knobbyette"

CENTRAL IRON & STEEL COMPANY
HARRISBURG PENNSYLVANIA

purchased two ships for $85,900 for scrapping anywhere and $48,700 for two more to be scrapped only in American yards.

Must Be Broken Up At Once

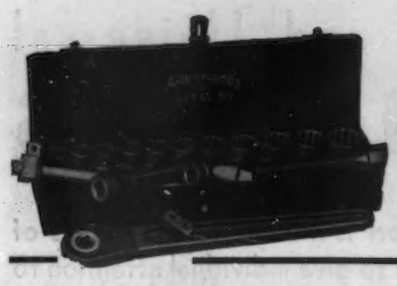
About 6000 tons of scrap will be recovered from two additional vessels which the commission is offering for sale on Nov. 10 in the event the ships are salvaged. Bids will be asked either for scrapping or domestic operations.

The ships are the two remaining vessels in the unit of the commission's laid-up fleet in Lake Union, Seattle, Wash. The vessels are the *Pacific Redwood* of 8682 dead weight tons and the *Pacific Spruce* of 8584 dead weight tons. If sold for scrap the ships must be broken up within a period of six months after the date of sale.

ARMSTRONG

Chrome-Vanadium Sockets and Wrenches

Only **ARMSTRONG** *has the* **Drivelock**



Detachable but RIGID!

ARMSTRONG Socket Wrenches offer all of the advantages of quick assembly; drivers, handles, extensions, ratchets—the full range of sizes and in addition *rigidity.*

With the patented Drivelock ARMSTRONG has brought socket wrenches up to industrial standards of strength and safety. A quarter turn of the lock pin locks socket to driver, driver to ratchet, extension to extension. Build up a tool of any length—each unit locks securely to the others. Regardless of size or shape this "1-piece" assembly will not pull, pry or knock apart.

Chrome-Vanadium Sockets 5/32 in. to 5 in.—all types. Drop Forged Ratchets, handles, extensions and sets for all purposes.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
309 N. Francisco Ave. CHICAGO, U.S.A.
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This Pulley Revolutionized FLAT BELT Performance...

TEN BIG POINTS

1 Belt slippage eliminated.
2 Belt sealed to pulley by Vacuum Cups.
3 Belt "slap" eliminated.
4 Tight stretching of belts unnecessary.
5 Life of belt greatly increased.
6 Use of belt dressing unnecessary.
7 Production noticeably stepped up.
8 No power loss on heavy shock loads.
9 No pulley maintenance expense.
10 Vacuum Cup Pulleys never wear out.

Solid and Split 2" to 72" Diameter

Patented in United States, Great Britain and Canada.

Pick out your toughest job and order a pulley on our 30-Day Free Trial Offer

VACUUM CUP METAL PULLEY CO., INC.
12536 GRAND RIVER AVE. DETROIT, MICH.
"A Belt Never Squealed on a Vacuum Cup Pulley"

Battleship Steel Bids Open Nov. 16

WASHINGTON, Oct. 26.—The Bureau of Supplies and Accounts, Navy Department, will open bids on Nov. 16 for 21,474 tons of plates, shapes, sheets, strips and bars to be used for the battleships North Carolina and Washington being built at the Brooklyn and the Philadelphia Navy Yards, respectively. On Nov. 5 the bureau will open bids for 775 tons of black and galvanized steel I-beams, welding quality, for these ships.

Republic Given Safety Awards

FIVE Republic Steel Corp. plants won first prize plaques and two others runner-up awards in the annual Metals Safety Contest sponsored by the National Safety Council.

Republic plants in the year ended July 1 had an accident frequency of only 5.1 injuries per million man hours worked against a frequency rate of 9.2 for the 231 steel mills, machine shops and foundries entered in the contest.

The South Chicago works of Republic topped 33 steel mills with only seven disabling injuries during 4,726,394 man hours, followed by the same company's Massillon and Canton works in second and third places.

Steel Dip Blamed On Rail Rate Cut

ABOLISHING of the railroads' emergency freight charge last December is an underlying reason for the decline in heavy industries and a stoppage of steel buying by most carriers, Duncan J. Kerr, president of the Lehigh Valley Railroad, believes.

Foreseeing a price increase, the railroads stocked heavily in rails last fall and still have a supply which would have been used up had the carriers obtained the greater income provided by the emergency freight charge, Mr. Kerr said. As it is, no heavy railroad buying of steel is expected this fall, he added.

Porcelain Enamelers Hold Annual Meeting

(CONTINUED FROM PAGE 53)

sales was through the advertising and sales promotion section.

The second Porcelain Enamel Institute Forum was opened the afternoon of Oct. 13 at Ohio State University.

J. E. Hansen of the Ferro Enamel Corp., opened the technical program with a paper on "Workable Control Systems and Benefits to the Enamel Plant," in which he discussed the control necessary for best results and economy in the proper preliminary preparation of the surface upon which the enamel frit is applied, proper preparation of the enamel frit as regards fineness of grinding and consistency, and proper methods of application.

Costs, incentive systems and safety in enamel shops were discussed in a general session following Mr. Hansen's address, and these papers were followed by others on welding, drawing and cleaning compounds, and the nickel treatment of enameling iron.

On the final day of the Forum meeting, colors and color matching, architectural porcelain enamel, drawing, pickle room practice, and control and consistency of enamels for dipping were discussed.

William E. Curran, Republic Steel Corp., Birmingham, spoke on "The Effect of Modern Blast Furnace Practice upon the Manufacture of Pig Iron," and emphasized that his remarks were concerned specifically with Southern iron. Mr. Curran, by the use of several interesting pictures, showed how blast furnaces have been enlarged and modernized, although the old lines and principles of design have remained much the same.

Tracing the improvement of merchant iron, Mr. Curran told of the adoption of the pig casting machine, changes to the cooling system and the subsequent elimination of chill. Studies revealed that chill elimination and grain structure varied considerably with the size of the pigs, and experimentation finally resulted in a 40 to 45-lb. pig being accepted as standard with more uniform grain-size and more free from chill than any other.

By studying in the foundries, some of the problems of the enameler are made more clear, and Mr. Curran has found that grain structure is an index to the enameling properties of a given analysis of iron. A uniform structure, free from dense splotches or tight spots, will produce castings which are best suited for enameling, he concluded.

Roto blasting, or airless cleaning, which he termed the modern method of cleaning cast iron ware, was discussed by R. E. Donnelly, Pangborn Corp., Hagerstown, Md. Mr. Donnelly said that "Roto blasting offers far faster blast cleaning, far better finish for enamel adherence, the elimination of costly compressed air" . . . . . and, with the use of steel abrasive, the elimination entirely of silaceous dust hazards. The net result," he continued, "is that you clean ware, first blast, second blast or deenamel at least twice as fast as with compressed air, and also at 50 per cent the cost a ton cleaned."

Other papers were read concerning the collection, handling and use of reclaimed enamels, ground coat dipping, cleaning and pickling practice, and the control and consistency of enamels for spraying.

TOOL STEEL
Trial and Error
is an expensive way to select tool steel. Avoid the false starts by calling in one of our representatives and presenting your problem to him.
He'll give you the benefit of our fifty years' experience in providing the world's finest steels for thousands of varied uses. Write, telephone, telegraph, or teletype . . . today.
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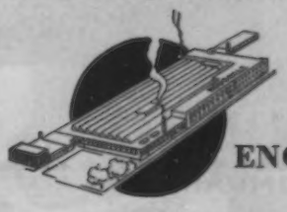
THE production of the famed Houdaille Hydraulic Shock Absorbers is only ONE of a wide range of Houde's achievements in precision engineering and machining.

You may have a single part, or possibly a complete mechanism, which Houde can produce for you with greater precision, greater speed, and at lower cost than your own facilities permit. The way to find out is to send us a blueprint for quotation.



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ENGINEERING CORPORATION
BUFFALO, N. Y.
A DIVISION OF HOUDAILLE-HERSHEY CORPORATION

PERSONALS

(CONTINUED FROM PAGE 76)

GEORGE W. PUTNAM, who has been superintendent of the open hearths of the Republic Steel Corp. in Youngstown since 1933, has been promoted to assistant district manager of the Warren-Niles district, succeeding F. C. FARRELL, who has been made assistant manager of the Canton-Massillon district. Mr. Putnam was graduated from Ohio State University in 1917, majoring in mining and metallurgy, and after graduation was employed by what is now the Wheeling Steel Corp. as a slagger. During the War he served in the air force as an instructor. After the War he was employed by the Goodyear Tire & Rubber Co. in Akron as a rim designer and later, for two years, was a highway engineer for the Ohio State Highway Department. In 1923 he joined the American Rolling Mill Co. at its Middletown plant as combustion engineer, two years later was appointed assistant superintendent of open hearths and in 1930 went to the Butler works, Butler, Pa., as superintendent of open hearths, remaining there until he joined Republic in 1933.

JONES N. CAHILL, who has been assistant superintendent of Republic open hearth plants at Youngstown, has been appointed superintendent of open hearths, succeeding Mr. Putnam. His first experience in the steel industry was as an open hearth clerk at the plant of the American Rolling Mill Co. in Middletown, Ohio. In 1919 he became melter foreman and in 1929 was transferred to the Ashland, Ky., division as assistant superintendent of open hearths. He joined Republic in 1932 in the same position.

R. J. SWEENEY, who has been chief metallurgist at Youngstown, has been promoted to assistant superintendent of open hearths, succeeding Mr. Cahill. Mr. Sweeney attended the University of Cincinnati and later Pittsburgh University, where he received the degree of Bachelor of Science in metallurgy in 1930. While attending college he was employed by the Wheeling Steel Corp., Bardes Range & Foundry Co., and the Bureau of Smoke Prevention, Pittsburgh. After graduation he joined the Carnegie Steel Co. at its Homestead works in the combustion and metallurgical department and later was made assistant superintendent of open hearths. He went with Republic in 1936 as metallurgist.

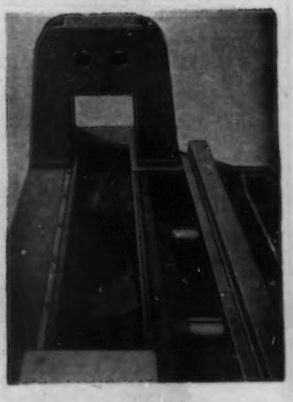
HOWARD J. WEIGEL, who has been assistant metallurgist, has succeeded Mr. Sweeney as metallurgist. Mr. Weigel studied metallurgy at Carnegie Institute of Technology, Pittsburgh, and in 1922 became associated with the Jones & Laughlin Steel Co. at Aliquippa, Pa., as metallurgical observer in the wire mill. In 1934 he was made assistant chief metallurgist at the Aliquippa works. He left Jones & Laughlin in March, 1937, to become assistant chief metallurgist of Republic in the Youngstown district.

H. F. MARQUARDT, who has been superintendent of the finishing mills of the Republic Steel Corp. at Buffalo, has been appointed assistant district manager succeeding, Edward I. Evans, who has been appointed to the general superintendency of the Gulfsteel

TRIPLE COMPRESSION
SCRAP BALERS

STYLE
100 TC
(100 x 51 x 36)
and other sizes

Also Regular
Double
Ram Presses
in all sizes



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COMPLETE LINE OF BALERS: Electric and Hydraulic, also HYDRAULIC PRESSES AND PUMPS

district of Republic, at Gadsden, Ala. Mr. Marquardt entered the steel industry with the Lackawanna Steel Co., by which he was employed for 13 years as a guide setter. In 1931 he became a rougher for the Donner Steel Co. and a year later a roller on the company's 14-in. mill. He was appointed assistant superintendent of the finishing mills in March, 1934, and superintendent in October the same year.

J. L. EDWARDS, who has been assistant superintendent of the finishing mills at Buffalo since 1934, has succeeded Mr. Marquardt as superintendent. Before his association with Republic, Mr. Edwards was connected with the Johnstown plant of the Bethlehem Steel Co. He joined Republic at Youngstown in 1932 as assistant superintendent of the blooming and billet mills.

CHARLES DEZUTTER has been appointed to succeed Mr. Edwards as assistant superintendent of the finishing mills. From 1918 to 1924 he was employed by the Bethlehem Steel Co. as an assistant roller and in the latter year he went to the Donner Steel Co. in the same capacity. Eighteen months later he was made roller on the 8-in. mill, which position he held until his recent promotion.

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E. S. BOSTON has been appointed St. Louis district sales manager of the Patterson Foundry & Machine Co., East Liverpool, Ohio. Mr. Boston is a chemical engineer and was graduated from the University of Wisconsin and the Armour Institute of Technology at Chicago. He was formerly connected with the laboratory of the Anaconda Copper Mining Co.

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A. B. CRAWFORD has been appointed manager of railway sales, Continental Roll & Steel Foundry Co., East Chicago, Ind., with headquarters in the Pittsburgh office. Mr. Crawford has been active in steel casting sales for many years, first with the Duquesne Steel Foundries Co. and continuing with the Continental Co. which was formed in 1930 by a merger of the Duquesne Co. with the Hubbard Steel Foundries Co., East Chicago, Ind., and the Wheeling Mold & Foundry Co., Wheeling, W. Va. He is a graduate of Carnegie Institute of Technology, class of 1916.

JAMES L. CAWPHON, JR., until recently Pittsburgh district manager of sales, American Steel Foundries, Chicago, has been appointed sales engineer of the Continental Roll & Steel Foundry Co., East Chicago, Ind., with headquarters in the Pittsburgh office. Prior to joining the American Steel Foundries, Mr. Cawphon had been for many years sales manager of the Bonney-Floyd Co., Columbus, Ohio. He was graduated from the University of Alabama in 1918.

❖ ❖ ❖

FRED L. RAUM has been appointed superintendent of the mill order and shipping department at the Pittsburgh works of the Jones & Laughlin Steel Corp. J. M. MORRIS has been made superintendent of the newly-created maintenance department. L. A. LAMBING has become superintendent of the open hearth and bessemer department, and W. A. HOLT has been named superintendent of the blooming mill. C. J. WYROUGH will head a new staff set-up as superintendent of steam efficiency and combustion.

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ANY PERFORATION
INDUSTRIAL and ORNAMENTAL
Perforated Metals
Regardless of your problems, whether they demand the screening of very fine and treacherous materials such as minerals, chemicals and other similarly hard-to-screen products or your requirements include grilles for use where beauty is a major consideration, you will find H. & K. perforations particularly suited to your purpose. Send us your specifications and permit us to prove H. & K. standard of accuracy and lasting performance.
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MARVEL
Cut Machine Hours, Man Hours and Costs
MARVEL No. 6A Capacity 6"x6"
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ONE MARVEL High Speed Saw with automatic bar push-up will do the work of many other sawing machines and men . . . will save machine hours and labor . . . will cut cutting-off costs per piece to a fraction.
Far heavier, all ball-bearing these new MARVELS are built for continuous operation at speeds, feed pressures, and blade tensions impossible heretofore. Absolutely dependable, they will hold their place in any production line —will saw straight, accurately, fast. Versatile and strictly multi-purpose, they require no special setting-up to change from job to job. They serve both as a production tool, and a superior, faster, general purpose saw.
Write for Bulletin 600
ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5749 Bloomingdale Ave., Chicago, U. S. A.

Welding Meeting

(CONTINUED FROM PAGE 51)

carry 4300 lb. more pay load than the riveted car, or almost 2.7 per cent more and without any additional transportation cost.

There is no doubt but that welding lends itself equally well to weight saving as it does in obtaining a design balance, he said in another part. Overlapping joints may be eliminated. Weakening of members by rivet holes will disappear. When thin sheets are riveted to their structural members it is the bearing value of the sheet on the rivet that is generally the limiting factor. By spot welding, the connection can be made the full value of the sheet without any detracting from the strength of the sheet.

Mr. Willoughby gave it as his opinion that the car of the future will be largely assembled by welding. This is especially true ,he said, for such welding as may be done in the sub-assembly. He believes, however, that the final assembly on the building track will be by riveting.

In a paper on "Machine Gas Cutting in Railroad Work," H. Bass, welding supervisor, Collinwood, Ohio, shops of the New York Central Railroad, discussed machine gas cutting in the centralized blacksmith, boiler, and machine shops which have replaced the smaller repair shops in the maintenance of a railroad's enormous amount of locomotives, rolling stock, rails, and auxiliary equipment.

Building Up Locomotive Driving Boxes

At the same session, Irving T. Bennett, Revere Copper & Brass, Inc., described the "building up" of locomotive driving boxes. These have a metal lining which accommodates the large driving wheels during occasional misalinement, as in rounding a curve. It has been customary to cast bronze on the face of the driving box to produce the lining.

In "building up," the welder simply deposits as many layers of bronze as necessary on the iron driving box. The bronze is supplied by an electrode made of Herculoy, containing 96 per cent copper, 3½ per cent silicon and ½ per cent tin. The electrode is ½-in. in diameter and is covered with a fluxing material which protects the bronze from burning as it melts from the electrode on to the iron driving box under the influence of a welding current of 650 amp. The molten bronze alloys to some extent with the iron and, therefore, is firmly bonded. New boxes are lined in about 40 min.

It is stated that the cast linings required renewal every 30,000 miles or so, whereas the build-up linings have a life up to 120,000 miles.

Three Sessions Devoted to Research Reports

Three full sessions of the 18th annual meeting of the American Welding Society were devoted to research in welding. The various reports and their authors are as follows: The Spot Welding Characteristics of Some Copper Base Alloys, by D. K. Crampton and J. J. Vreeland, Chase Brass & Copper Co.; Survey of Low-Alloy Steels as to Weldability, by J. H. Critchett, Union Carbide & Carbon Research Laboratories; and X-ray Methods of Studying Stress Relief in Welds, by J. T. Norton, Massachusetts Institute of Technology.

Also Fatigue Tests of Butt Welds in Plates, by W. M. Wilson, University of Illinois; The Heat Effect in Welding, by W. H. Bruckner, U. S. Naval Research Laboratory; Power Supply for Welding, by A. S. Douglass and L. W. Clark, Detroit Edison Co.; and An Alternating Current Non-Destructive Test for Welded Seams, by W. V. Kouwenhoven, Johns Hopkins University and A. E. Vivell, Princeton University.

Also, Welded Girders with Inclined Stiffeners, by Cyril D. Jensen and W. F. Lotz, Jr., Lehigh University; Welding of Copper, by A. P. Young, Michigan College of Mining and Technology; Static and Impact Tensile Properties of Stainless Steel Welds at Ordinary and Low Temperatures, by O. H. Henry, Polytechnic Institute of Brooklyn; Effect of Welded Top Angles on Beam-Column Connections, by Inge Lyse and G. J. Gibson, Lehigh University, and Studies of the Oxy-Acetylene Cutting Process, by H. R. Bullock, Massachusetts Institute of Technology.

The technical session held jointly with the American Society of Mechanical Engineers featured the following papers: Resistance Welding Fabrication, by J. M. Cooper, General Electric Co.; Developments in Large Welded Structures, by C. C. Brinton, Westinghouse Electric & Mfg. Co., and Recent Developments in Fusion Welding, by C. W. Obert, Union Carbide & Carbon Research Laboratories.

Chemical Exposition To Be Held Dec. 6

THE Exposition of Chemical Industries, opening at the Grand Central Palace, New York, on Dec. 6, announces as the winner of its contest for a slogan for the chemical industries Norman E. Diehl, assistant division purchasing agent of the E. I. duPont de Nemours Co., Wilmington, Del.

Mr. Diehl won a first prize of $250 for the slogan, "Chemical Research Creates Industries" in a contest drawing hundreds of entries.

Ingenious operating exhibits revealing the latest developments in the fields of chemical raw materials, consumer goods and plant equipment will be displayed at the chemical show.

Steel exhibits will feature black scale-free pipe, galvanized pipe and seamless condenser tubes. Tubes made of chromium alloy with additions of molybdenum and titanium will be shown. One exhibit will reflect the commercial development of tungsten and molybdenum sheets.

Interesting process equipment on display at the Chemical Exposition will include a magnetic separator for removing iron and other magnetic particles from suspension in liquids.

Specialized applications of lead and its alloys will include homogeneous lead-lined vacuum apparatus, evaporator tanks, steam jacketed kettles, agitators, treater drums and car tanks. Related metal products on display will include antimonial sheet lead and tellurium sheet lead, also piping.

Charles F. Roth, president of the International Exposition Co. is directing the chemical display.

Machine Tool Builders Discuss Problems Caused By New Relations With Government

HOT SPRINGS, Va., Oct. 26.—An unusually large attendance and a program of outstanding constructive interest characterizes the 36th annual convention of the National Machine Tool Builders Association, being held at the Homestead Oct. 25 to 27.

At the opening session on Monday morning, Clayton R. Burt, president of the association, delivered an address entitled "More Goods for More People," which is published on page 87 of this issue of THE IRON AGE. This is a thoughtful and clearly reasoned refutation of the fallacies of the theory of restriction and scarcity now being put into legislative practice through the Corporate Surplus Tax Act and other measures.

President Burt was followed by Tell Berna, general manager of the association, who spoke on the work of the association. Mr. Berna sketched the changing objectives and problems of the membership from the consideration of the metric system as an American standard in the early days to the present study of the current problems introduced by the changing relationship of government to business. Of great importance in this situation, said Mr. Berna, have been the statistics compiled and issued by the association, particularly the index of machine tool orders, which has become an accepted indicator of executive sentiment regarding the manufacturing outlook.

Labor Act Restricting Recovery

James A. Emery, general counsel of the National Association of Manufacturers, was a guest speaker at the opening session. He spoke on the subject, "Federal Regulation of Private Employment." "What is the effect of public policy as expressed by government upon our business?" asked Mr. Emery. Answering this question, he stated that in effect, although not intent, it resembled a concerted effort to prevent an efficient recovery.

PRESIDENT, Howard W. Dunbar (above), vice-president, Norton Co., Worcester, Mass. First vice-president, Newton A. Woodworth, president (below) Ex-Cell-O Aircraft & Tool Corp., Detroit.

New directors, Harry W. Wendt, chairman Buffalo Forge Co., Buffalo; W. E. Whipp, president Monarch Machine Tool Co., Sidney, Ohio; S. F. Newman, vice-president Landis Machine Co., Waynesboro, Pa.

Sketching the growth of public or Federal control of private employment relations, Mr. Emery cited the ill-fated NRA, which sought to effect such regulation through application of the interstate commerce principle. This principle, said the speaker, which gives government the power to remove obstructions to commerce, while affirmed by the Supreme Court in connection with the succeeding National Labor Relations Act, has been ignored by the National Labor Board. Intended, as it was, to equalize bargaining power between employers and employees, the interpretation of the act by the board has been so one-sided, as Mr. Emery put it, "as to give an employer about as much chance as Hitler would give a Jewish rabbi who was brought up before him on charges."

Under the interpretation of this act, the right to decline to associate, which is as important as the right to associate, is set completely aside. This right to not associate or to choose with whom one will associate is the basis of religious, fraternal, political and business relations, but is completely ignored in the administration of the Labor Relations Act. Congressional examination of this act and its interpretation is imperative, said Mr. Emery, as is the imposing of responsibility upon labor organizations upon whom such vast powers have been conferred.

Unions Would Control Wages and Hours Under Law

Directing attention to the proposed wage and hour legislation, the speaker pointed out that the effect of this will not be to confer upon a board of five the power to establish maximums for hours and minimums for wages but to place this power in the hands of labor unions, with the board merely carrying out of reinforcing their agreements. He also cited the anomalous competitive differentials that would exist possibly for one

(CONTINUED ON PAGE 109)

BENJAMIN F. FAIRLESS
Newly elected president of U. S. Steel Corp.

B. F. Fairless Elected President of U. S. Steel Corp.; E. R. Stettinius To Become Chairman

BENJAMIN F. FAIRLESS this week was elected president of United States Steel Corp. to succeed William A. Irvin.

Simultaneously it was announced that on April 5 Edward R. Stettinius, Jr., will become chairman of the U. S. Steel board of directors.

Mr. Fairless has been president of Carnegie-Illinois Steel Corp. and Mr. Stettinius is chairman of U. S. Steel's finance committee.

These changes in the top management of U. S. Steel accompanied word to the more than 200,000 stockholders that the corporation would pay a dividend of $1 on the common shares, the first such payment by Big Steel in the post-depression period.

Many Changes Announced

With elevation of Mr. Fairless to the presidency of U. S. Steel, an event forecast by persons close to the industry for some time, the corporation announced these additional changes in personnel:

Mr. Irvin becomes vice-chairman of the corporation on Jan. 1, the date on which Mr. Fairless comes to New York to head the company's far-flung operations.

J. L. Perry, president of the Tennessee Coal, Iron & Railroad Co., succeeds Mr. Fairless as president of Carnegie-Illinois with headquarters at Pittsburgh.

Robert Gregg, commercial vice-president of U. S. Steel, will become president of the Tennessee Coal, Iron & Railroad Co., with headquarters at Birmingham.

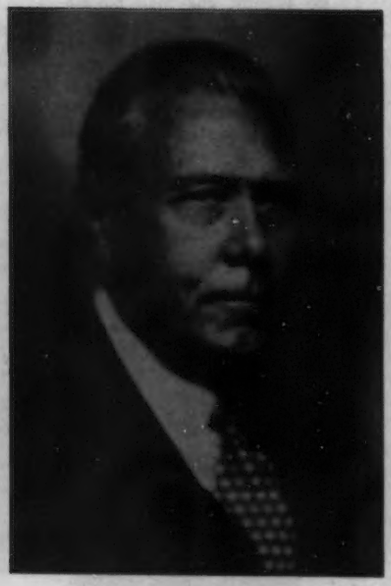
Elected a Director

In addition to becoming president of the corporation, Mr. Fairless was elected a director to succeed Thomas Morrison, of Pittsburgh, once a partner of Andrew Carnegie, who resigned.

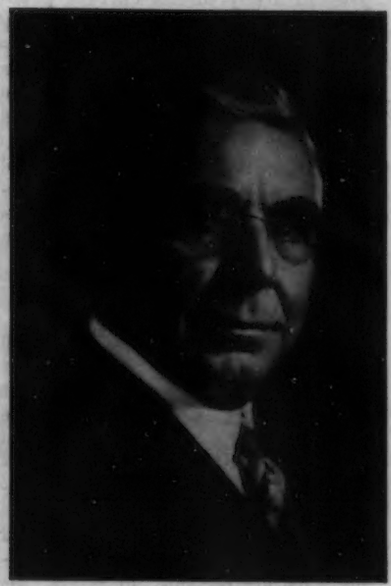
Enders M. Voorhees, now vice-chairman of the finance committee, becomes chairman of that committee, according to the corporation's announcement.

Mr. Fairless, formerly president of Central Alloy Steel Corp., a vice-president of Republic Steel

EDWARD R. STETTINIUS, JR.
Slated to be U. S. Steel's chairman



MYRON C. TAYLOR
Will retire as Big Steel's chairman



WILLIAM A. IRVIN
Moves from president to vice chairman

Corp. and holder of other important positions in the steel industry, was born at Pigeon Run, Ohio, on May 3, 1890, the son of a coal miner.

He attended school at Justus, Ohio, and then, by teaching school at Rockville and Navarre, Ohio, earned money enough to enroll at Wooster, Ohio, college. He transferred to Ohio Northern university, where he was graduated with a civil engineering degree. A few years ago this school conferred upon him the honorary degree of doctor of engineering.

A Civil Engineer

Mr. Fairless' business career began in June, 1913, as a civil engineer for the Wheeling & Lake Erie Railroad. In August of that year he became a civil engineer for the Central Steel Co., of Massillon, Ohio, then advanced rapidly to mill superintendent, general superintendent, and vice-president in charge of operations.

When the United Alloy Steel Corp. and Central Steel merged in 1926, Fairless was made a vice-president and general manager of the combined companies, a position he held until becoming president in April, 1928.

When Central Alloy become one of several companies merged to form Republic Steel Corp., Mr. Fairless became a vice-president of the latter concern. In the autumn of 1935, when Carnegie-Illinois Steel was formed, Mr. Fairless became president succeeding I. Lamont Hughes.

Mr. Stettinius, who will become chairman of the corporation to succeed Myron Taylor, veteran leader of Big Steel, entered the steel business by way of the automobile industry.

Son of the late Edward R. Stettinius, a former partner of J. P. Morgan & Co., Mr. Stettinius entered General Motors Corp. in 1924 through the Hyatt Roller Bearing Co. He became assistant to John L. Pratt, vice-president of General Motors in charge of accessory divisions, and later became assistant to the then president, Alfred P. Sloan, Jr.

On Many Boards

In 1934 Mr. Stettinius resigned to become vice-chairman of U.S. Steel's finance committee. On Jan. 1, 1936 he was elected chairman of that committee and a director.

Mr. Stettinius was also a director and vice-president of General Aviation Corp., a director and member of the executive committee of North American Aviation, Inc., a director and member of the executive committee of Transcontinental and Western Air Express and a director of Eastern Air Transport.

He was in active charge of the National Share-The-Work movement for the Second Federal Reserve district in 1932 under the general supervision of Walter C. Teagle, president of the Standard Oil Co. of New Jersey.

Another Step Forward

Selection by Mr. Taylor of Mr. Stettinius and Mr. Fairless for the top positions in U.S. Steel marks another long step forward in the reorganization and coordination of all the corporation's activities in the last few years.

Signed With Union

During the last 12 months Mr. Taylor in a series of dramatic moves in his management of the world's largest steel company, shattered tradition by signing a collective bargaining contract with representatives of steel labor, restored the corporation's common stock to a dividend basis, expended many millions of dollars in plant improvements at Pittsburgh, Birmingham and elsewhere and now, as a climax placed two young men to chart Steel's future course.

Mr. Fairless is 47 and Mr. Stettinius is 37 years old.

Both Mr. Stettinius and Mr. Fairless represent a type of executive becoming more common in industry. Agreeable, diplomatic, conciliatory where compromise is required, both men bring to U.S. Steel's leadership qualities beyond mere ability to make and sell steel.

It was Mr. Fairless who last year sat down with Philip Murray, Steel Workers Organization committee leader, to negotiate the first collective bargaining agreement

E. M. VOORHEES
Elected chairman of the Finance Committee

J. L. PERRY
President of Carnegie-Illinois Steel Corp.

ROBERT GREGG
President of Tennessee Coal, Iron & Railroad Co.

ever signed by U.S. Steel with a labor representative.

Astonished at a reception of Youngstown business men honoring him when he left that city in 1935 to head Carnegie-Illinois, Mr. Fairless said:

"What touches me about this gathering is that you folks were enough interested in my getting another job to give up an evening at home with your families and come down here."

Stays at 71 Broadway

What Mr. Taylor's position will be in the new Steel corporation was explained in a brief announcement that:

"Myron C. Taylor confirmed to the board his intention, as previously stated to them, not to accept reelection as chairman of the board of directors at the time of its annual meeting, April 4, 1938. Mr. Taylor will thereafter maintain his present offices at No. 71 Broadway, and will continue as a member of the board and of the finance committee."

For several years prior to 1928 Mr. Taylor had retired from personal business operations and spent much of his time traveling. But he was persuaded by the late George F. Baker, Sr., and J. P. Morgan to take a more active part in U. S. Steel and became chairman of the finance committee in December, 1927, after the death of Judge Gary.

Elected Chairman

In 1932 Mr. Taylor became chairman of the board and chief executive officer. Soon after he resigned as chairman of the finance committee in favor of W. J. Filbert. In 1929 Mr. Taylor carried through a reorganization of the financial structure of the Steel corporation by which approximately $350,000,000 of its bonded indebtedness was paid off and the corporation emerged in the summer of that year free of debt. The great market crash followed in November and the decline in business set in. Evidently Mr. Taylor thought he would stand by during the storm. He has continued to do so.

Irvin Moved Up

When Mr. Taylor became chairman of Steel's board, William A. Irvin, once a telegraph operator for the Pennsylvania railroad, became the corporation's president.

With the Pennsylvania Mr. Irvin had advanced himself to be assistant freight and passenger agent. He entered the steel business in 1894 with the P. H. Laufman Co., Ltd., Appollo, Pa., subsequently working his way to the superintendency when the company was taken over by the American Sheet Steel Co. in 1900.

When American Sheet Steel was merged with American Sheet & Tin Plate Co., Mr. Irvin in 1904 began a climb which made him vice-president of that organization, then vice-president in charge of operations for U. S. Steel and finally president of U. S. Steel.

Nine years' association with the Johns-Manville Corp. as general auditor, treasurer, secretary, vice-president and a director, prepared Enders M. Voorhees, for his new post as finance committee chairman.

Entered Exporting Trade

Mr. Voorhees is 45 years old. Born in Amsterdam, N. Y., where he attended high school, Mr. Voorhees was graduated from Dartmouth college in 1914. He began his business career with Hollis H. Sawyer and Co., of Boston, later going to Manila, P. I., with the Pacific Commercial Co., an exporting and importing firm.

This was followed by three years with the U. S. Rubber Co. in New York. Before joining Johns-Manville, Mr. Voorhees was engaged in industrial engineering for William A. Harriman & Co. and Sanderson and Porter.

J. L. Perry, the new Carnegie-Illinois head, was born in Worcester, Mass., March 11, 1881. He was educated in the grade and high schools of Worcester.

He began his business career with the American Steel & Wire Co., in its Worcester plant in 1899, and after occupying various positions became manager of the Worcester district of the American Steel & Wire Co. in 1928.

On Jan. 1, 1933, he was promoted to the vice-presidency of American Steel & Wire Co. in charge of operations with headquarters at Cleveland.

On Feb. 1, 1935, he was elected president of the Tennessee Coal, Iron & Railroad Co. of Birmingham.

Third Quarter Earnings

Earnings of the corporation for the third quarter were $48,213,455 compared with $30,044,389 in the corresponding period last year. The net earned on capital stock was $30,617,638 in the past quarter against $13,636,177 a year ago. Total earnings for the nine months were $147,190,286 and net income in the same period was $95,352,853.

The corporation's statement said:

"The demand for steel products during July, August and September showed a gradual decline in volume each month as the quarter progressed from the tonnage booked in the first half of the year but exceeded considerably the tonnage booked in corresponding quarter in 1936. Operations for the third quarter as measured by finished product output averaged 73.6 per cent of total capacity, compared with 88.4 per cent in the previous quarter, and 63.6 per cent in third quarter of 1936.

"Shipments of steel products during the third quarter were 3,342,572 tons, a decrease from the previous quarter of 14.6 per cent. For the nine months of this year shipments totaled 10,956,846 tons, or at the rate of 81.4 per cent of capacity. In recent weeks a rather marked falling off in shipments to customers occurred resulting in an October average to date of approximately 54 per cent of capacity."

The directors declared the regular quarterly dividend of $1.75 per share on the preferred stock, also a dividend of $1 per share on the common stock. The last previous dividend on common stock was paid March 30, 1932.

Expenditures made during the first nine months of 1937 for additions and betterments to plant and property, and for payment of maturing bonds and other capital obligations of subsidiary companies, amounted to approximately $81,000,000. At this date the unexpended balances on authorized appropriations for additions and betterments stood at about $113,000,000.

Net working assets of the Corporation and the subsidiaries, exclusive of dividends declared and unpaid, were, at the respective dates named below, as follows:

Dec. 31, 1935	$389,123,253
Dec. 31, 1936	391,330,566
Sept. 30, 1937	419,031,875

Expansion Held Up By Sheet & Tube

YOUNGSTOWN SHEET & TUBE CO. has postponed indefinitely the expansion and modernization program planned for its Indiana Harbor works, East Chicago, Ind., because of unfavorable economic conditions, according to an official of the company. Part of $30,000,000 voted for modernization and other uses is to be spent in the Chicago district.

Industry's Development Retarded By Government's Lack of Understanding

By CLAYTON R. BURT

President National Machine Tool Builders Association and President Niles-Bement-Pond Co.

o o o

THE great objective of our machine tool industry, the objective which all of our engineers and designers, executives and operators are striving to accomplish, is the extension of that general well-being that is so concisely expressed in the phrase "More Goods for More People."

That objective inspires our efforts to furnish industry with more accurate and more productive equipment. It is an objective that may well command universal respect. It is one that has a broad background of success, for every scrap of evidence available proves that the development of production, transportation and communication to their present highly mechanized state has been accompanied by a steady growth in employment and a richer, more abundant life for the masses of the people.

That objective expresses our interest, as machine tool builders, in the welfare and prosperity of all lines of industry, because every industry from its inception depends upon the services of machine tools.

Moreover, the steady flow of more goods and better goods to an evergrowing population is, as it should be, the avowed aim of the administration at Washington. Most of the experimental legislation that causes us so much anxiety has been imposed in the name of this ideal. The difficulty is that Washington has some novel plans, yet unproven, regarding the distribution of goods to more people, but has neglected the important point that there must also be more goods produced if the distribution is to be permanently effective.

Government Needs Understanding of Industry's Problems

It is apparent that a very important requisite has been overlooked, namely, understanding and appreciation on the part of the Government of the problems of industrial management. Our great social structure has become so complicated that it is vitally necessary for industry to cooperate with the Administration, and this we have faithfully tried to do. It is quite as necessary for all branches of the Government to co-operate with the managers of industry. That has not been done, and persistence in this course is dangerous.

This lack of understanding of industry's problems has made us all reluctant partners in some unusual experiments. Highly restrictive legislation, intended to help the working classes at the expense of stockholders, has handicapped some industries to such a degree that it is doubtful whether they can survive under continuation of these policies. A very few industries have benefited temporarily. Most of us have become fearful of the future because of the constantly growing burden of Government debt, of taxes, of mounting costs, and rising prices. We are fearful because of our progress toward the goal of well-being for all elements in our great nation may be destroyed because of this lack of understanding of industry, and its grave importance to all classes of our people whom we are trying to help.

We are more disturbed by the current recession of business, which is occurring in spite of the known shortages of housing, foodstuffs, materials and equipment. To replenish these needs should keep all of our industries running at full capacity. In machine tools alone, we know that our customers have scarcely begun to replace the old equipment that is no longer giving efficient service. No one can blame executives or managers for the cautious policy that they find it necessary to adopt, but we regret that the aggregate of production in many lines is less than is actually needed to supply the wants of the whole people at prices they are able to pay.

Tax on Undistributed Earnings

As one example of misdirection on the part of the Government, due to a lack of comprehensive understanding of industry's financial problems, I cite the tax on undistributed surplus laid upon corporations by the 1936 Revenue Act. The acknowledged purpose is to force a distribution of earnings, as well as to provide revenue to the Government. It is based upon a misconception of the term "profits" which leads its proponents to consider all income in excess of current expenses as available for dividends or taxes, and to look with suspicion upon reserves.

This particular legislation, if continued, will defeat the aims of the Administration in several directions, not the least among them the stabilization of production and employment, which is so vital to prosperity. Those who were responsible for this law were not fully informed of the importance of corporation reserves to the country during the bad years of 1930 to 1934. During these years, while the Government spent eight billions of dollars in an effort to restore a normal balance, corporations spent over 18 billion dollars more than they received. To do this they not only had to have a surplus on hand, but that surplus had to be readily available in cash or quick assets; not tied up in buildings or frozen in finished goods for which there was no market.

In the machine tool industry most companies retained a nucleus of skilled workmen at all kinds of odd jobs throughout the depression

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An address delivered before the 36th annual convention of the National Machine Tool Builders Association, Hot Springs, Va., Oct. 25.

so that they would be available immediately upon resumption of operations as a result of an improvement in business. In this industry, as well as in many others, research, redesign and development of new products provided work for a sizable staff while business was dull. At no time during these years did employment fall as low as the indexes of production.

Research and design during a depression period requires a substantial amount of money, and it takes courage to spend money in excess of income at a time when it is impossible to see what the next day will bring forth. The estimated loss in capital and surplus of the machine tool industry during the depression, based on an association study, amounted to between 35 and 40 per cent of the financial strength of the industry.

Places Heavy Penalty on Industry

Any conservative executive considers it his first duty to restore his depleted cash reserves when business returns, in order that his company may be prepared to face the next emergency. The surplus tax provision, by making this almost impossible, places a heavy penalty on industries like our own, where earnings not distributed to stockholders are appropriated by the Government in the form of taxes, and these earnings are lost as a backlog for the industry. Its financial position must then be gaged purely on current business. Its credit will fluctuate with the volume of orders, or lack of them. Without means to finance employment in dull times, its employees will suffer the same risks as the stockholders. No orders, no work, no dividends and no purchasing power. The possibilities that this surplus earnings tax carries for hastening and prolonging depressions are appalling and certainly were not taken into consideration by the authors of the bill which was so hastily put through to become a law.

To furnish more goods to more people, with our increasing population, industry must expand. The normal growth of a corporation is ordinarily financed out of surplus. We are now told that industrial expansion should be paid for by the sale of new securities. Large companies can sell bonds at a moderate cost, approximately 10 per cent. Small companies must sell common stock, and the cost is about 15 per cent. The large corporation with a national reputation can easily find a market for its securities. It is extremely difficult for the small and practically unknown concern to raise capital in this way.

The net result is to favor the expansion of large corporations at the expense of the smaller ones, and these smaller ones are essential to our national well-being. Competition still is, and always will be, a fundamental necessity if we are to make progress. These small corporations in the aggregate are not only employers of thousands of people, they also represent the most effective check on a trend toward monopoly. Furthermore, no corporation, large or small, can be reasonably expected to sell its securities in a thin, poorly supported market.

Fortunately, there is evidence that even the proponents of this legislation are beginning to see that it is unworkable, and revision of the 1936 Revenue Act is likely. It is our duty to see that Congressmen are better informed when that revision is under consideration than they apparently were last fall.

Increase in Tax Burden

Another matter of deep concern to every American business man is the constant increase in Government expeditures and the apparent inability of the Government to come appreciably near to a balanced budget. We are all familiar with the fact that the national debt is now 37 billion dollars. We are not as conscious of the tremendous aggregate of state debts, amounting in 1936 to a total of three billion dollars. To this must be added the accumulated debts of smaller political subdivisions. The figures are so large as to challenge our understanding. It may mean more to say that each family in the country must assume as its average share a debt of $1,700.

The magnitude of Government debt is reflected in the constantly increasing burden that rests on corporations in the form of taxes. The Class I railroads in the United States have 93 per cent of the total mileage. The increase in the tax burden on these railroads from 1915 to 1937 is from 157 million to 320 million of dollars, an increase of 90 per cent in 21 years.

The Westinghouse Electric & Mfg. Co. recently advised its stockholders that its tax bill had increased from two and a half million dollars in 1934, to five million dollars in 1935, and to nine million dollars in 1936. That is an increase of 260 per cent in two years.

In 1890 corporations paid 5 per cent of their income in taxes to the National Government. While some of their earnings went to stockholders, a substantial portion was set aside for the replacement of obsolete equipment and for the revamping of manufacturing facilities as new needs developed. It is from this source that we derived the remarkable expansion of American industry from 1900 until the present day, with a consequent increase in employment from 29 million to 45 million workers. The policy of taxing heavily the earnings of corporations discourages

Burt-isms

WASHINGTON has some novel plans, yet unproved, regarding the distribution of goods to more people, but has neglected the important point that there must also be more goods produced if the distribution is to be permanently effective.

* * *

HOW far the recession that is now under way may go no one can surely tell, but if production were based on potential demand there need be no let-down in the production of goods in the industries where these shortages exist.

WE are fearful because our progress toward the goal of well-being for all elements in our great nation may be destroyed because of this lack of understanding [by Government] of industry.

* * *

WE must see to it that our Congressmen realize the responsibility that rests upon them in the next session * * * ; we must endeavor to show them that there is only one worthy goal for both business and Government, and that is the production and distribution of more goods to more people.

this reinvestment of funds and is a powerful force tending to crystallize industrial enterprise at a capacity less than is necessary to keep abreast with the natural growth of the population.

For several years economists have raised warnings that it is impossible for nations as well as individuals to live beyond their income and not face a day of reckoning. Indications would point to the fact that the Administration and general public are beginning to recognize this truth, particularly as the President recently has promised that the budget will be balanced. If that means that the Administration is beginning to be just a bit uneasy about its unproductive expenditures, there is hope that some of the policies in effect during the past few years may be replaced by a more sound plan of outright co-operation with the management of industry in the production of foodstuffs and goods necessary to provide for the payment of these bills.

Rising Costs of Production

Rising labor costs, without commensurate increases in labor efficiency, likewise constitute a restriction on production. A constantly increasing proportion of the dollar received by the manufacturer is going to the payrolls of the workers. It has frequently been pointed out that labor is only one element in cost, and that a 10 per cent increase in your payroll might mean only an increase of 2.4 per cent in the cost of the finished product. When, however, increases in wage rates take place not only in your factory but in the plants of those who supply you, in mines, in transportation, and in factories in every field of industry, the general tendency to increase wages is reflected in everything you buy and in every element of cost; not merely in your payrolls. In 1936, 66.5 per cent of the national income went to labor.

We are not opposed to increased wages. We believe in so improving the efficiency of industry as to increase the output per man employed, thereby making higher wages possible. We are opposed to arbitrary increases by legislative measures. Such increases are unsound—they cannot be maintained and only benefit a few at the cost of other workers not equally favored. They inevitably cause higher prices and decreased consumption.

The next session of Congress will be called upon to push a bill providing for minmum wages and maximum hours of labor; these to be fixed by a national board, politically appointed. What the outcome of such legislation will be remains to be seen, but one certain result will be the further extension of administration costs, which likewise must be met by further calls upon the corporations of the country for more taxes, causing further increases in the cost of production.

I have touched only upon the most glaring restrictions that are limiting the production and distribution of goods to such a point that the shortages built up during the years of depression are far from being made up. Yet we see the beginnings of a period of dull business. How far the recession that is now under way may go no one can surely tell, but if production were based on the potential demand there need be no let-down in the production of goods in the industries where these shortages exist.

Congress Should Be Made to Realize Responsibility

For the best interests of the country it is imperative that this present period of industrial activity continue and not be allowed to develop into a tailspin, and as at no other time Washington can prevent such a calamity by recognizing the effects of its past experiments, and by showing at least some understanding of the place that industry in this country holds in the pattern of prosperity.

As machine tool builders and as citizens of our country, we must see to it that our Congressmen realize the responsibility that rests upon them in the next session which has recently been called for Nov. 15. We must endeavor to show them that there is only one worthy goal for both business and Government, and that is the production and distribution of more goods to more people. Individual initiative and private enterprise have been responsible for the proggress of the country in the past, and they will provide progress for the future if permitted to function. They will not take the risks they must take, if Government goes too far with restrictive legislation and oppressive taxation.

The re-establishment of a trend toward a balanced Federal budget, the withdrawal of restrictive taxation and the abandonment of impractical attempts at national planning would be immediately reflected in stabilized business, pushing forward with confidence to the common goal we are all striving for.

Steel Industry's Coke By-Products $133,000,000 in 1936

GAS, tar, oils, and chemicals valued at more than $133,000,000 were produced by the steel industry in 1936 as by-products incidental to the production of coke for use as fuel for the industry's blast furnaces, the American Iron and Steel Institute has estimated. Some of the by-products were sold, while others were used by the producers.

Bulking largest among the volatile products recovered from coke was gas, of which nearly 525,000,000,000 cu. ft. valued at $85,400,000 was recovered by the steel industry during 1936. About 36 per cent of the gas was used to heat the coke ovens, while the balance was used either as fuel for open-hearth furnaces or was marketed.

Next most important by-product was tar, of which more than 420,000,000 gal., valued in excess of $18,000,000, was recovered.

Nearly 127,700,000 gal. of crude light oils, such as benzol, toluol and naphtha, valued at more than $14,400,000, were also by-products of the steel industry during 1936.

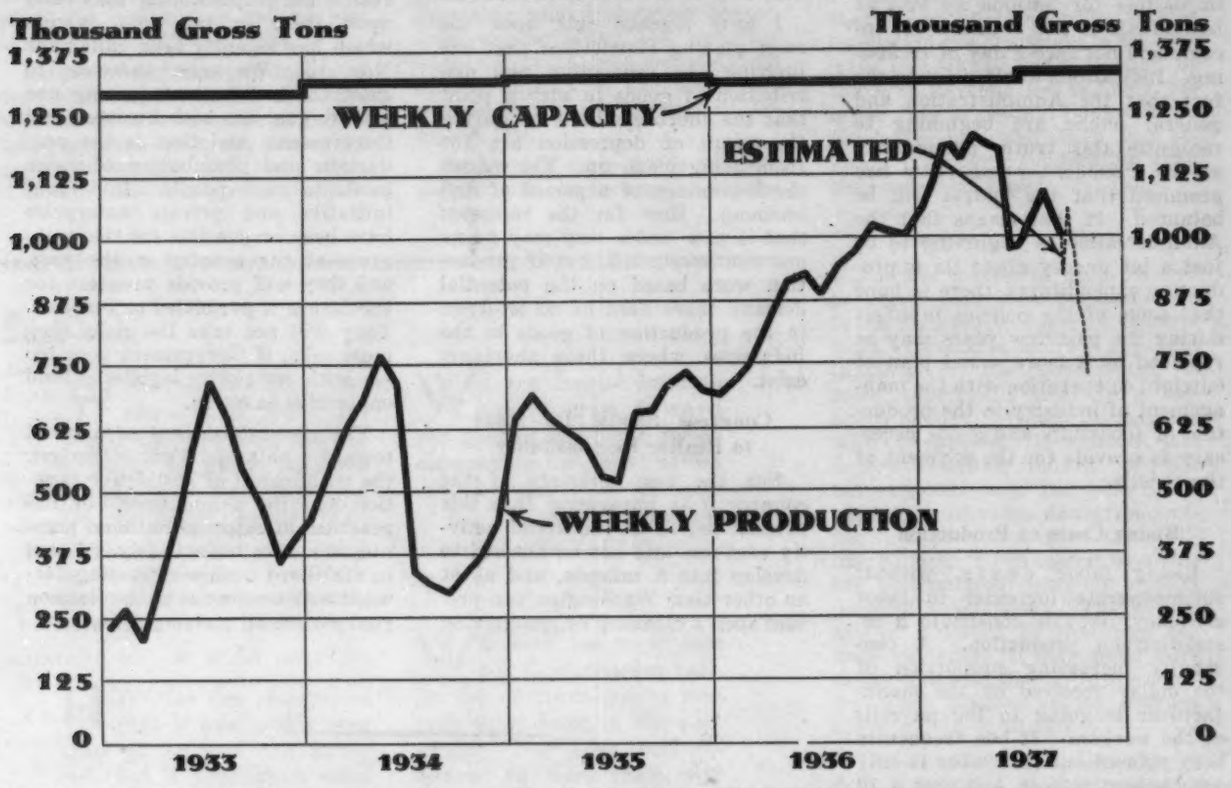
Almost $10,000,000 worth of ammonium sulphate, a valuable agricultural fertilizer, and ammonia liquor, from which are made refrigerating gas, household ammonia and various chemicals, was produced during the year.

Stettinius, Swope, Scheduled On Radio

EDWARD R. STETTINIUS, JR., chairman finance committee, United States Steel Corp., heads a list of prominent industrialists scheduled soon to speak over the radio in broadcasts sponsored by the Business Advisory Council of the Department of Commerce. Other are Gerard Swope, president, General Electric Co.; Ralph E. Flanders, president, Jones & Lamson Machine Co.; Morris E. Leeds, president, Leeds & Northrup Co., and Roland J. Hamilton, president, American Radiator Co.

PRODUCTION

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1933-1937, and Estimated Production by Weeks in 1937



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	Last Week
Pittsburgh	42.0	50.0
Chicago	44.0	45.0
Valleys	49.0	52.0
Philadelphia	52.0	54.0
Cleveland	60.0	71.0
Buffalo	52.5	64.0
Wheeling	76.0	74.0
Southern	55.0	55.0
Ohio River	48.0	66.5
Western	65.0	65.0
St. Louis	46.0	55.5
Detroit	90.0	90.0
Eastern	62.0	62.0
Aggregate	51.0	55.5

Weekly Booking of Construction Steel

	Week Ended				Year to Date	
	Oct. 26, 1937	Oct. 19, 1937	Sept. 28, 1937	Oct. 27, 1936	1937	1936
Fabricated structural steel awards	23,400	5,500	18,115	9,300	903,285	878,980
Fabricated plate awards	1,870	755	1,775	9,760	91,355	201,165
Steel sheet piling awards	0	0	0	1,575	42,430	48,275
Reinforcing bar awards	2,700	2,000	6,225	7,145	255,625	291,890
Total Lettings of Construction Steel	27,970	8,255	26,115	27,780	1,267,425	1,420,310

. . . .SUMMARY OF THE WEEK. . . .

▼ ▼ ▼

. . . Steel production in further decline to 51%.

° ° °

. . . Bottom believed to have been reached, though buying lags.

° ° °

. . . Railroad rate decision not expected to have much immediate effect.

STEEL ingot production for the country has declined this week to 51 per cent from 55½ per cent last week, and the industry is looking to additional orders from the automobile industry to prevent a further recession.

Operations have dropped so sharply in some districts that the present low rates would suggest that a bottom has been reached. At Chicago, for example, where there had been a decline of 33 points within four weeks, a further drop of only one point was recorded this week. At Pittsburgh the rate has lost another eight points to 42 per cent, though in the neighboring Wheeling-Weirton district a rise of two points to 76 per cent has occurred. Production is down 11 points in the Cleveland-Lorain area to 60 per cent, 11½ points off in the Buffalo district to 52½ per cent, 18½ points down in southern Ohio to 48 per cent, and 9½ points in the St. Louis district to 46 per cent. Lesser declines have occurred elsewhere, as for example three points at Youngstown and two points in eastern Pennsylvania.

Rarely, if ever, in the history of the steel industry has so sharp a decline in production occurred within such a short time. It is now apparent that stocks in the hands of consumers and jobbers at the end of the summer were larger than was generally realized by the steel industry itself. Meanwhile, however, the downward adjustment of steel production has probably taken place more rapidly than decline in consumption. While steel users are living off their stocks, the time when replenishment buying on a larger scale will be necessary is still uncertain. The steel industry is resigned to the belief that spotty buying will prevail over the remainder of the year, but looks for a fairly substantial rise in January in line with usual seasonal expectations.

HOPES that the granting of higher freight rates to the railroads would result in an almost immediate release of some railroad buying were dispelled when the amount of the increases, which do not cover rises in costs for materials and labor, became known. No major move toward resumption of railroad buying is now expected until the Interstate Commerce Commission shall have granted further relief to the carriers. Three large roads are known to have inquiries ready for about 1000 box cars each, but these may not be immediately released. The rate decision is not expected to stimulate demand for steel from miscellaneous consumers in view of the fact that the maximum increase is 20c. a ton, which is probably not enough of a saving to induce buyers to anticipate the effective date of the advance.

Although the automobile industry is approaching a high rate of production, its volume of steel purchases is still less than had been expected. The motor car manufacturers are proceeding cautiously because of fear of further labor disturbances and the desire to test out the market for cars following the price advances and curtailment of spending power. Such spotty improvement as has occurred in steel buying, however, has been mainly due to the belated automobile orders. Some units of the farm machinery industry, which has been running at top speed, have curtailed steel shipments temporarily because of shutdowns for annual inventory.

Lettings of steel for construction projects make a better showing this week, totaling 23,400 tons, of which about 13,000 tons is for the Bronx-Whitestone bridge, New York. New projects are also in larger volume at 32,500 tons, including 10,700 tons for a section of the Delaware River aqueduct in New York State, 3000 tons for the Calvin Coolidge bridge at Northampton, Mass., and 4000 tons for a Ford Motor Co. blast furnace at Dearborn, Mich. The Ford company is taking bids this week on 20,000 tons of structural steel for a new press shop. A program for reconstruction of Chicago's transportation system to cost $157,000,000 has been proposed by the mayor of that city.

SCRAP prices have again dropped sharply in all districts. No. 1 heavy melting steel is down $1 a ton at Pittsburgh and Philadelphia, and 25c. at Chicago, reducing THE IRON AGE scrap composite to $14.83, or $7.09 below the high point of the year and back approximately to the level of early August, 1936.

. . . PITTSBURGH . . .

. . . Operations decline eight points to 42 per cent of capacity.

o o o

. . . Orders slightly up for some companies but down for others.

o o o

. . . Scrap market weak, melting steel declining $1 a ton.

PITTSBURGH, Oct. 26.—The total volume of finished steel sales in the past week was irregular, with some companies reporting a moderate increase in demand and others experiencing a decrease.

As has been the case for the past several weeks, the improvement has been brought about by a fair rate of wire and sheet buying, all of which can be traced either directly or indirectly to automobile specifications.

Demand for hot rolled bars has slipped off a trifle, but semi-finished and structural steel bookings are on a par with a week ago. A minor increase in oil country goods specifications might suggest the end of the declining demand for this product.

Tin plate specifications are off seasonally and operations this week are estimated at 70 to 75 per cent.

Producers have found it necessary to curtail ingot output, and Pittsburgh operations this week are down eight points to 42 per cent of capacity, but a rise of two points to 76 per cent of capacity is indicated for the Wheeling district.

With the railroads ready to ask for further freight increases, and it being obvious that recently granted commodity increases are not enough to offset advanced labor cost, it is not expected that any major move toward equipment buying will materialize in the immediate future. However, with the Interstate Commerce Commission allowing the railroads to put the latest freight increases into effect on five days' notice, some railroad buying might appear sooner than expected.

The scrap market is weaker with No. 1 heavy melting off $1 to $15 to $15.50 a ton.

Pig Iron

Although shipments are holding up as well as a week ago, releases on contracts have slowed up some. Spot business is exceptionally dull and some producers feel that lack of customer buying is due to the latter depending heavily on stocks at their plants. With the wide spread between pig iron and scrap prices it is expected that present pig iron prices will be reaffirmed.

Semi-Finished Steel

Although semi-finished steel specifications improved slightly during the past week, total tonnages are still somewhat below the volume placed several weeks ago. Demand for sheet and tin bars has fallen off as most non-integrated makers have ample stocks to take care of the present volume of business.

Bars

Total hot rolled bar sales are slightly behind the volume of a week ago. Customers are still exhibiting a cautious attitude and are depending as far as possible on inventories. Some automobile buying is present while the remainder of the orders appear to include fill-in requirements from various manufacturers. Specifications for alloy steel bars have improved somewhat during the past few weeks.

Cold Finished Bars

New business is ahead of a week ago, with the improvement being entirely due to automotive purchases. While automobile makers are specifying a little more freely, tonnages placed are still below what had been expected. Further buying by farm implement manufacturers has materialized. Demand from the jobbing trade and miscellaneous sources continues at low ebb.

Reinforcing Bars

Outstanding awards during the past week included 875 tons for a memorial hospital at Chicago, to Inland Steel Co., Chicago, and 500 tons for a Queens County sewer project to Joseph T. Ryerson & Son, Chicago, through Cleverok, Inc., New York. Inquiries, although fairly numerous, cover projects calling for rather small tonnages. Another Queens sewer project will take 2500 tons.

Plates and Shapes

Structural plate and shape specifications during the past week were about on a par with the previous two periods. New inquiries for the most part include publicly financed projects and tonnages involved are not large. The total number of awards was rather small and tonnages averaged around 160 tons apiece.

Tubular Products

Although total tubular sales are no better than a week ago, the decline in oil-country goods specifications appears to have been checked. Orders for oil-country goods during the past week, if anything, were slightly better than in the previous period and the volume of this type of business undoubtedly represents immediate requirements. Pipe production continues at a higher rate than incoming business as most mills have not yet completed stock replenishments. An oil company recently placed an order for export involving about 3500 tons of 12-in. seamless line pipe.

Sheets

Sheet purchases in the past week were about on a par with the previous period; however, in the past few days some automotive buying has materialized. There has been a tendency toward better diversification in orders lately, which might signify that some customers' stocks have been substantially depleted during the past several weeks. This has been especially reflected in specifications from jobbers, refrigerator makers and household appliance interests. Total buying by miscellaneous sources,

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Oct. 26, 1937	Oct. 19, 1937	Sept. 28, 1937	Oct. 27, 1936
Rails, heavy, at mill	$42.50	$42.50	$42.50	$36.37½
Light rails, Pittsburgh	43.00	43.00	43.00	35.00
Rerolling billets, Pittsburgh	37.00	37.00	37.00	32.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	32.00
Slabs, Pittsburgh	37.00	37.00	37.00	32.00
Forging billets, Pittsburgh	43.00	43.00	43.00	39.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	2.05
Bars, Chicago	2.50	2.50	2.50	2.10
Bars, Cleveland	2.50	2.50	2.50	2.10
Bars, New York	2.78	2.78	2.78	2.40
Plates, Pittsburgh	2.25	2.25	2.25	1.90
Plates, Chicago	2.30	2.30	2.30	1.95
Plates, New York	2.53	2.53	2.53	2.19
Structural shapes, Pittsburgh	2.25	2.25	2.25	1.90
Structural shapes, Chicago	2.30	2.30	2.30	1.95
Structural shapes, New York	2.5025	2.5025	2.5025	2.16¼
Cold-finished bars, P'gh	2.90	2.90	2.90	2.35
Hot-rolled strips, Pittsburgh	2.40	2.40	2.40	1.95
Cold-rolled strips, P'gh	3.20	3.20	3.20	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	2.60
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	2.70
Sheets, galv., No. 24, P'gh	3.80	3.80	3.80	3.20
Sheets, galv., No. 24, Gary	3.90	3.90	3.90	3.30
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	1.95
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.05
Cold-rolled sheets, No. 20, Pittsburgh	3.55	3.55	3.55	3.05
Cold-rolled sheets, No. 20, Gary	3.65	3.65	3.65	3.15
Wire nails, Pittsburgh	2.75	2.75	2.75	2.05
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.10
Plain wire, Pittsburgh	2.90	2.90	2.90	2.50
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.55
Barbed wire, galv., P'gh	3.40	3.40	3.40	2.55
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	2.60
Tin plate, 100 lb. box, P'h	$5.35	$5.35	$5.35	$5.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	Oct. 26, 1937	Oct. 19, 1937	Sept. 28, 1937	Oct. 27, 1936
No. 2 fdy., Philadelphia	$25.76	$25.76	$25.76	$21.3132
No. 2, Valley furnace	24.00	24.00	24.00	19.50
No. 2, Southern Cin'ti	23.69	23.69	23.69	19.44
No. 2, Birmingham†	20.38	20.38	20.38	15.88
No. 2, foundry, Chicago*	24.00	24.00	24.00	19.50
Basic, del'd eastern Pa.	25.26	25.26	25.26	20.8132
Basic, Valley furnace	23.50	23.50	23.50	19.00
Malleable, Chicago*	24.00	24.00	24.00	19.50
Malleable, Valley	24.00	24.00	24.00	19.50
L. S. charcoal, Chicago	30.04	30.04	30.04	25.7528
Ferromanganese, seab'd carlots	102.50	102.50	102.50	75.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.
*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$15.25	$16.25	$17.75	$17.50
Heavy melting steel, Phila.	15.25	16.25	18.25	15.75
Heavy melting steel, Ch'go.	14.00	14.25	16.75	16.25
Carwheels, Chicago	16.50	16.75	18.00	16.50
Carwheels, Philadelphia	18.25	18.75	20.25	16.75
No. 1 cast, Pittsburgh	17.75	18.25	19.25	16.25
No. 1 cast, Philadelphia	18.25	18.75	20.25	16.75
No. 1 cast, Ch'go (net ton)	13.75	13.00	13.50	14.00
No. 1 RR. wrot., Phila.	18.25	19.25	20.25	15.75
No. 1 RR. wrot., Ch'go (net)	12.00	12.25	14.50	14.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.25	$4.25	$4.25	$3.75
Foundry coke, prompt	5.00	5.00	5.00	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	12.00	12.00	13.00	9.75
Lake copper, New York	13.125	13.125	13.125	9.87½
Tin (Straits), New York	48.50	47.875	57.875	44.45
Zinc, East St. Louis	5.75	6.00	7.25	4.85
Zinc, New York	6.10	6.35	7.60	5.22½
Lead, St. Louis	5.35	5.35	5.35	4.55
Lead, New York	5.50	5.50	6.00	4.70
Antimony (Asiatic), N. Y.	18.25	18.25	18.25	12.50

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Oct. 26, 1937	2.605c. a Lb.	$23.25 a Gross Ton	$14.83 a Gross Ton
One week ago	2.605c.	23.25	15.58
One month ago	2.605c.	23.25	17.58
One year ago	2.197c.	18.73	16.50

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1937	2.605c., Mar. 9	2.330c., Mar. 2	$23.25, Mar. 9	$20.25, Feb. 16	$21.92, Mar. 30	$14.83, Oct. 26
1936	2.330c., Dec. 28	2.084c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., Apr. 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., Apr. 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., Apr. 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

however, is still somewhat below expectations.

Tin Plate

Seasonal factors continue to exert their influence with the result that tin plate operations may be estimated this week at 70 to 75 per cent. Some plants have realized lower operating rates by cutting down the number of mills in operation, while others have cut down the number of turns per week.

Wire Products

Wire sales continue to reflect odd lot buying practices. Manufacturers' wire specifications have been holding up fairly well, although demand from some quarters has declined slightly. Despite the fact that jobbers in agricultural regions are enjoying a healthly volume of business, they have shown no disposition to place orders with producers except only where it is absolutely necessary. It is estimated that some jobbers have stocks sufficient to last from 30 to 60 days, while others appear to be fairly well cleaned out.

Strip

The total volume of hot and cold rolled strip business shows no improvement from previous periods. Producers are receiving some automotive specifications, but tonnages involved are not large. Miscellaneous buying for the most part is comprised of fill-in orders, with many consumers apparently determined to reduce inventories drastically before making new commitments.

Coal and Coke

Demand for industrial coal continues rather sluggish, with little chance of a pick-up in the near future. It is not expected that the Coal Commission will have price schedules ready much before the first of the year. Demand for beehive furnace and foundry coke is exceptionally dull and more ovens have been taken out of operation during the past week in the Connellsville, Pa., district.

...Farm machinery makers the most active consuming group.

ST. LOUIS, Oct. 26.—The agricultural implement industry stands out as the one group of melters that has not reduced its consumption of pig iron. Makers of all kinds of machines to be used on the farm are working at full capacity and are planning to maintain this rate at least for the remainder of 1937. Farmers have the money to spend, and will spend it for machines that will lighten their burden, makers believe, and are basing their operations on this belief.

The stove foundries in the St. Louis area plan to start their seasonal letup, between Dec. 1 and 10, two weeks earlier than they usually do, because of a falling off in business. The washing machine industry is said to have started off slowly. Jobbing foundries are holding their operations to two to three days a week. Shipments of pig iron are light, and so are sales.

The market for finished steel continues quiet, with no indications of any marked buying movement soon. Consumers hesitate to buy because of heavy stocks bought before price rises and a diminishing order file. The recent reaffirmation of present prices for the first quarter of 1938 has had no effect on buying. While there have been no cancellations, there have been some suspensions of shipments previously booked. Business with the structural fabricating plants is especially light.

Ingot operations are down to 42 per cent of capacity.

...Pig iron shipments steady; steel buying lags.

BIRMINGHAM, Oct. 26.—The steel and pig iron markets are rather quiet. Pig iron producers are in a better position than steel producers, as they have large bookings for the fourth quarter and are shipping steadily against such backlogs. The steel mills have caught up with most of their backlogs and current bookings are light.

Pig iron production and steel production are unchanged. Seventeen blast furnaces are active, and 14 open hearths. For the past three weeks steel production has remained steady at 14 active units and the same number is scheduled for this week.

Last week the National Labor Relations Board for District 10 filed formal complaint with the national board in Washington against the Tennessee Coal, Iron & Railroad Co. A hearing has been scheduled for Nov. 1 in Birmingham. Charges are based on the 1936 strike of red ore miners.

Three reinforced concrete bridges are included in the highway projects on which the Alabama Highway Department will open bids Nov. 2. Georgia opened bids Friday, Oct. 22, on 14 road projects, with low bids totaling $827,056.51.

... 1500 tons required for buildings in Hawaii.

SAN FRANCISCO, Oct. 25.—Although awards were light, a number of new projects were announced last week to be opened to bidding in the near future. Hawaiian Pineapple Co., Honolulu, T. H., will open bids within the next two weeks on 1500 tons of structural shapes required for the construction of five new buildings. Five new bridge construction projects involving some 1300 tons of structural steel have been announced throughout the Western states. Bids on each of these will be opened about Nov. 1.

William Brothers & Haas, Inc., are low bidders on the general contract for the Sunset Discharge line between Sunset Reservoir and 7th Avenue, San Francisco. The project calls for approximately 1000 tons of 60-in. steel pipe.

Largest single award of the week was that of 526 tons of structural steel for an overcrossing at East 46th Street, Denver, to Bethlehem Steel Co.

U. S. Pipe & Foundry Co. took 960 tons of cast iron pipe in three projects. Largest of these was 500 tons awarded by Fresno, Cal.

The scrap market is at almost a complete standstill. Of the 260,000 gross tons of scrap shipped from Pacific ports during the first eight months of 1937, less than 6000 tons has been shipped during the past month and a half. Prices have fallen considerably.

. . . . CHICAGO . . . .

. . . Operations level off, declining only one point in week.

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. . . Railroad equipment inquiries pending but may not be issued immediately.

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. . . Chicago transportation program to cost $157,000,000 announced.

CHICAGO, Oct. 26.—After a drop of 33 points in the past four weeks, the decline in operations this week of only one point to 44 per cent of capacity gives hope that consumption and production are now about on a par, and that the movement henceforth will be upward. Only one producer showed a curtailment in operations this week as contrasted with four last week.

Hopes for increased steel purchasing are still fixed upon two main factors, automobiles and railroads.

The most evident result of the granting of higher rates on certain types of freight to the railroads is their widespread disappointment that the increases were not more far-reaching and more remunerative. As a result, it is not expected by steel companies, railroads and car builders that additional equipment programs will be forthcoming on the strength of these increases. At least 10,000 to 12,000 cars are believed to be under consideration, and awaiting more favorable news from the I.C.C. before being released. About 30,000 tons of ½-in. plates may be required for the construction of 3000 box cars for which three roads, one in the East, another in the Middle West and a third on the West Coast, are understood to be on the verge of inquiring, although no definite announcements have been made.

A meeting of the railroad presidents here this week is expected to clarify the carriers' attitude toward the freight rate increases just granted, another petition for further advances and the possibility of equipment buying before additional funds are secured.

Some slackening in specifications is being felt because of the regular shutdown of some of the farm implement manufacturing plants for inventory. Caterpillar Tractor shut down today for two weeks and several plants of International Harvester Co. are understood to be holding up all shipments for a like reason. It is believed that operations at these plants are to be resumed at capacity.

Mayor Kelly of Chicago last week announced a transit rehabilitation program which calls for the expenditure of $157,000,000 on subways and elevated highways. If this program goes forward, and it seems certain that some phases of it will be accepted, an extremely large market for steel, especially shapes and reinforcing bars, will be created.

Pig Iron

Shipments are tending downward, both on pig iron and foundry coke. One seller estimates a 20 per cent reduction for the month in pig iron and states that coke shipments are already down to 8 per cent better than September from 11 per cent better only last week. On the bright side, a general jobbing foundry reports the best business in its history. Foundries melting for farm implement and tractor castings are well occupied and the automobile foundries have great hopes for higher production.

Wire and Wire Products

Sales and specifications of wire and wire products are practically unchanged from last week, very little movement either upward or downward being noticed. The farm equipment manufacturers continue the best customers of the wire mills. Automobile buying is still lagging.

Sheets

Cold rolled sheets can be obtained in less than three weeks.

Plates

One mill reports slightly better plate business than in the previous two weeks, but backlogs are still almost non-existent and deliveries are prompt. Tank builders are fairly active but most of their work is composed of small jobs. A Japanese inquiry for 70 storage tanks involves 22,000 tons of plates. If car details can be worked out quickly, inquiries may be seen soon from three roads for 1000 box cars each. Each of these will call for 10,000 tons of ½-in. plates. It is estimated that from 10,000 to 12,000 cars are under consideration and that some action may be seen shortly on some of these projects.

Shapes and Bars

Awards are few and small and inquiries are mostly insignificant.

REINFORCING STEEL

. . . Awards of 2700 tons —9055 tons in new projects.

AWARDS

New York, 105 tons, bars and mesh, paving for Henry Hudson bridge, to Fireproof Products Co., New York.

Queens, N. Y., 110 tons, highway project, to Concrete Steel Co., New York.

Queens, 500 tons, sewer project, to Joseph T. Ryerson & Son, Inc., Chicago.

Belle Isle, N. Y., 160 tons, New York Central grade elimination, to Bethlehem Steel Co.

Pittsburgh, 200 tons, Pittsburgh & Lake Erie Railroad power house, to Jones & Laughlin Steel Corp.

Detroit, 275 tons, grade separation on Seven Mile Road and John R. Street, to Truscon Steel Co., Youngstown.

Chicago, 875 tons, Wesley Memorial Hospital, to Inland Steel Co., Chicago.

Milwaukee, 130 tons, Pabst Brewing Co. building, to Joseph T. Ryerson & Son, Inc.

Redmund and Stonecut, Cal., 200 tons, over and underpasses, to Kyle & Co.

Cantu, Cal., 125 tons, All-American Canal; bids opened.

NEW REINFORCING BAR PROJECTS

Northampton, Mass., 510 tons, Calvin Coolidge bridge.

Westchester-Putnam Counties, N. Y., 783 tons, West Branch-Kensico section, Delaware aqueduct. Bids received until

Nov. 9 by Board of Water Supply, New York.

New York, 275 tons, bars and mesh, viaduct, 135th Street-Lincoln Avenue, Bronx; bids close Oct. 28.

Queens, N. Y., 2500 tons, sewers and appurtenances.

Syracuse, N. Y., 100 tons, Charles Andrews School; bids taken Oct. 25.

Lakehust, N. J., 190 tons, highway routes 37 and 40; bids Nov. 1 at Trenton.

Norristown, Pa., 1000 tons, hospital; bids Nov. 3.

Monmouth County, N. J., 150 tons, mesh and bars for highway, route 4; bids Nov. 1 at Trenton.

Bucks County, Pa., 120 tons, highway bridge.

Knox County, Pa., 110 tons, highway structures.

Washington, 150 tons, faculty building, Catholic University.

Washington, 100 tons, Jewish Community Center building.

Arlington, Va., 500 tons, laboratory and shop building, Department of Agriculture.

Wickliffe, Ky., 1000 tons, highway bridge; Albert Lyons, Rogersville, Tenn., low bidder on general contract.

East Moline, Ill., 150 tons, Campbell's Island bridge.

Sparta, Ill., 100 tons, Sparta-LaCrosse bridge over Mississippi River.

Sioux Falls, S. D., 125 tons, J. I. Case Co. plant.

West Fargo, S. D., 175 tons, Armour & Co. building.

Rock Island, Ill., 110 tons, office building; bids rejected and plans will be revised.

Konx County, Ohio, 102 tons, highway bridge; Lewis & Frisinger, Ann Arbor, Mich., low bidders.

Cheyenne, Wyo., 148 tons, State highway works; bids opened.

Missoula, Mont., 138 tons, State highway bridge; bids Nov. 5.

Phoenix, Ariz., 115 tons, Salt River project; bids opened.

Earp, Cal., 156 tons, Parker Dam project; bids opened.

Los Angeles, 140 tons, outlet works at San Gabriel Dam; Consolidated Steel Corp. low bidder.

Mendocino County, Cal., 100 tons, bridge over Jug Handle creek; bids Nov. 10.

RAILROAD BUYING

St. Louis-San Francisco has ordered six 70-ton well-type cars from American Car & Foundry Co.

American Car & Foundry Motors Co. has received an order from Connecticut Railway & Lighting Co., Bridgeport, for seven motor coaches.

J. G. Brill Co. has received an order for 100 car sets of seats for subway cars now being built by American Car & Foundry Co. and Pullman Standard Car Mfg. Co. for Board of Transportation, New York.

New Rail Rates, Excluding Coal, Likely to Cost Steel $9,743,657

WASHINGTON, Oct. 26.—Freight rate increases granted by the ICC last week, based on the 1936 volume of traffic, will cost the iron and steel industry an estimated $9,743,657 without including the higher rates granted on bituminous coal or on scrap in the western district.

This estimate covers coke, iron ore, pig iron, and steel manufactures and is based on the calculation made by the railroads except that the estimate on iron ore revenue is revised downward so as to make allowance for the ICC's denial of the proposed increased rates on Minnesota ore to Lake Superior docks. This would reduce the original estimated revenue by about $1,918,000, leaving the total estimate for iron ore rate increase at $2,357,064.

The largest charge on the steel industry will lie on finished products rated fifth class in official classification, the estimate being $4,151,157. Excluding coal, the total increased freight cost to be paid by the steel industry will be roughly 20 per cent of the aggregate estimated annual increase of $47,500,000 for all commodities.

The highest increase will apply to bituminous coal. Railroads estimate that increased revenue from bituminous coal will be $26,882,030, a large tonnage of which, of course, goes to the steel industry. The furnace slag increase is estimated at $126,262.

Using the railroad figures except in the case of iron ore and based on the 1936 volume, the estimate is as follows:

	Eastern District (Including Pocahontas Region)	Southern Region	Western District	United States
Coke	$731,842	$75,876	$129,507	$937,225
Iron Ore	1,623,392	23,013	710,659	2,357,064
Pig Iron	395,455	50,210	71,667	517,332
Iron and Steel, rated 6th class in o.c.,** n.o.s.	403,360	5,722	8,279	417,361
Rails, fastenings, frogs, and switches	119,536	13,012	35,327	167,875
Cast iron pipe and fittings	79,452	79,643	34,042	193,137
Iron and steel pipe and fittings, n.o.s.	504,430	26,614	216,563	747,607
Iron and steel, nails and wire, not woven	167,681	20,288	66,930	254,899
Iron and steel, rated 5th class in o.c.,** n.o.s. (also tin and terne plate)	3,318,108	204,597	628,452	4,151,157
	$7,343,256	$498,975	$1,901,426	$9,743,657

** Official classification.

European Scrap Agreement Continued

LONDON (*Special Correspondence*).—It is announced from Warsaw that the extension of the international steel scrap agreement until Dec. 31, 1937, has been decided upon.

It is stated that all requirements for the current year have been covered. No contracts have been arranged for the first quarter of 1938, it being considered preferable to await developments.

In view of the Sino-Japanese conflict, the International Raw Steel Association at the Warsaw meeting considered the question of restricting exports of raw steel and steel products. It was decided to fix for that purpose a monthly total of 450,000 tons of raw steel.

This decision is intended as a guidance to the members of the cartel and not as a compulsory rule. The cartel also decided not to make any change in export quotations.

The International Rail Cartel decided to maintain existing prices until further notice.

Structural Steel Orders Not Gaining

SEPTEMBER orders for fabricated structural steel totaled 117,859 tons, compared with 117,612 tons for August and 118,158 tons in September of last year, the American Institute of Steel Construction reported.

Against average booking for the years 1928-31, September business was 50.4 per cent of normal and compared with September shipments of 154,295 tons.

. . . CLEVELAND . . .

. . . Operations drop 11 points in Cleveland-Lorain, three points at Youngstown.

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. . . Turning point upward expected to come with larger automobile releases.

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. . . Higher freight rates on steel may not stimulate much immediate buying.

CLEVELAND, Oct. 26.—Ingot output dropped rather sharply in the Cleveland district this week, now being 60 per cent of capacity, an 11 point decline. Output in the Youngstown district declined three points to 49 per cent of capacity. Belief is expressed that the low point of operations has about been reached in the two districts.

The trend in the demand for finished steel was slightly downward the past week. However, there is feeling in the industry that the volume of business will not further decline. An upward turning point is looked for when specifications in better volume come from motor car manufacturers, who are still buying rather sparingly. Some Ohio sheet mills that usually get considerable business from the Ford Motor Co. are feeling severely the effects of the absence of new Ford specifications. Miscellaneous demand is still of a hand-to-mouth character.

The advance in railroad freight rates is not expected to have an immediate effect on the volume of steel business. Volume buying of rails and equipment by railroads centering here is not looked for before early in 1938. Most of these purchases for the current year were made late last year. Higher freight rates are not expected to stimulate the miscellaneous demand or steel as the advance is not sufficient to cause consumers to place steel in stock to get the benefit of present freight rates. The same may be said of pig iron. The new freight rates will not become effective for several weeks or possibly before Jan. 1, in the opinion of local traffic managers, because it takes some time for the railroads to prepare new tariff schedules.

Michigan ore mining companies are disturbed because a freight rate increase of 6c. a gross ton has been made on ore shipments from their mines to upper Lake shipping ports, while no increase has been made on shipments from Minnesota mines to upper Lake ports.

Steel makers have started to figure out the increase in their production costs that will result from higher freight rates on ore, coal and other raw materials.

Pig Iron

With industrial skies clouded as they are at present, some foundries that have been accustomed to purchasing good-sized quantities of pig iron are now buying in lots of a car or two at a time. This policy is causing a restriction in the volume of business. Shipments are holding at recent volume, the expected improvement this month not having materialized. Motor car and agricultural implement foundries continue to take good tonnages. Foundries are not expected to build up stocks to avoid the increase in freight rates, as the maximum increase of 20c. a ton does not offer enough incentive to put in stocks. With no advance in switching charges, consumers at points of production will have an increased advantage over foundries that will have to pay the higher freight rates and this applies to foundry coke as well as to pig iron. Pig iron producers also will be affected by the increase in freight rates, as they will have to absorb a portion of the increased rate for shipments to consuming points where they compete with other producers having lower rates.

Sheets and Strip

New demand for sheets shows little change from the past two or three weeks. Fresh orders continue to come from motor car manufacturers, but for much smaller lots than these companies normally buy when they are under fair operations. Some stamping plants in this territory have secured releases of motor car parts and these plants are ordering sheets a little more freely. Demand from miscellaneous consumers continues light. Orders for hot-rolled strip in larger lots than had been purchased recently were placed during the week by some of the automobile parts manufacturers. Orders for sheets and strip by consumers outside of the motor car field are confined to small lots for immediate needs. Mills are badly in need of orders.

Wire Products

The demand continues very light. Consumers of manufacturers' wire in the automotive and other fields are buying only in small lots for their current needs and little business in merchant wire products is coming from jobbers.

Bars, Plates and Shapes

While some business in merchant bars is coming from automobile parts manufacturers, the volume is disappointing. Miscellaneous demand continues light. While the demand for plates and shapes is dull, one producer reports a little improvement for these products. Activity in the construction field remains light. The largest award during the week was 200 tons for a Toledo factory building. Inquiries are out for two Ohio bridges requiring 400 tons. The Pennsylvania Railroad took bids Monday for its dock improvements at Sandusky, requiring 385 tons of reinforcing bars. In the construction of this dock 4500 tons of sheet steel piling will be used but this piling was purchased from a Pittsburgh district mill last January. The project will include a car dumper requiring 650 tons of structural shapes, for which bids have been taken.

Iron Ore

Although many boats have been taken out of commission, ore shipments have held up fairly well this month, the movement so far indicating total shipments of 7,000,000 tons for October provided weather conditions continue favorable. Operators of Michigan and Wisconsin mines are dissatisfied with the ac-

tion of the Interstate Commerce Commission in raising the freight rate 6c. a gross ton on ore from mines in those states without authorizing a similar advance on ore to the roads that serve the Minnesota mines. The additional rate will apply to no 1937 ore except the comparatively small tonnage that will be shopped from lower Lake docks to consuming points after the rate advance becomes effective.

Consumption of Lake Superior ore during September amounted to 5,157,411 tons, a decrease of 215,853 tons from August. This compares with 4,026,690 tons consumed in September last year. Furnace stocks Oct. 1 were 34,826,601 tons and stocks at furnaces and docks were 39,953,601 tons, compared with 31,977,663 tons on the same date last year. There were 148 furnaces in blast using Lake ore Oct. 1, a loss of eight for the month.

. . . *Further curtailment in steel and pig iron making.*

BUFFALO, Oct. 26.—Further curtailment has occurred in ingot production, the Bethlehem Steel Co. having reduced its active open hearths from 20 to 16 and the Wickwire-Spencer Steel Co. having taken off one, which leaves one in service. The Republic plant continues to operate five out of nine. The Wickwire-Spencer company has also blown out its one active blast furnace.

More activity among foundries making automobile parts has encouraged blast furnace interests to look for a better melt. New business is light, most foundries having covered for their fourth quarter needs.

More than a score of school jobs will interest the steel construction material firms within the next month or so. Only one out as yet is the Canaseraga, N. Y., central school involving 180 tons of fabricated structural and a lesser tonnage of steel slabs. Bids will be taken Nov. 5. At Syracuse, the Charles Andrews School will require 100 tons of reinforcing bars and the Edward Smith School at Syracuse a bar tonnage as yet unstated. A Buffalo fabricating structural concern will supply 160 tons for All Saints Church, Buffalo.

Cleveland plans about three miles of 30 to 36-in. steel pipe for new main water line from Parma reservoir to Rocky River Drive. Cost over $600,000; also new 24 to 38-in. steel pipe line for main water in Harvard Avenue, connecting with Warrensville reservoir. Cost close to $250,000. Financing has been arranged through Federal aid. L. A. Quayle, City Hall, is city engineer in charge.

Barnsdall Oil Co., Tulsa, Okla., plans welded steel pipe lines for natural gas gathering system in Harper oil area, Ector County, Tex., with main steel transmission line to Foster district, same county, to new natural gasoline plant in last noted area. Compressor stations will be installed for booster service.

Angle Lake Water District No. 53, King County, Seattle, RFD, C. C. Fallis, secretary, has called special election Oct. 30 to approve plans for water system, including main steel pipe line and distribution lines. Cost close to $50,000. Parker & Hill, Smith Tower Building, Seattle, are consulting engineers.

Shell Pipe Line Corp., Shell Building, St. Louis, will carry out construction by company forces of new 8-in. welded steel pipe line from recently opened oil field at Roxana, Ill., to Indianapolis, about 250 miles, for gasoline transmission to bulk terminal to be erected at latter place. Award for part of pipe, about 10,500 tons (150 miles) has been let to National Tube Co., Pittsburgh, and contract for remainder, about 7000 tons, same size, will be made soon. Pumping stations will be installed at points along route. Cost close to $3,000,000.

Allegany Refiners, Inc., Bolivar, N. Y., has work under way on new 3-in. welded steel pipe line from Kussuth, Phillips Hill and Vosburg oil field districts to pumping stations at Bolivar, about six miles, for oil transmission.

Rochester Gas & Electric Co., 89 East Avenue, Rochester, N. Y., plans extensions in pipe lines for gas distribution in Mount Reed Boulevard, Continental Drive, Pittsford Road and other streets. Cost over $100,000.

Andrews, Tex., has let contract to Kelly Construction Co., Builders' Exchange Building and San Antonio, Tex., for steel pipe system for gas distribution at price of $34,990. C. A. Harper, Brady Building, San Antonio, is consulting engineer.

Farmington, N. H., will announce plans soon for waterworks to cost approximately $31,224. Weston & Sampson, 14 Beacon Street, Boston, are engineers.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Slocum, N. Y., asks bids until Nov. 1 for cast iron water pipe; also galvanized wrought iron pipe (Proposal 842-14).

Sewerage and Water Board, New Orleans, has plans for new 48-in. line from water purification plant to Claibourne Avenue and vicinity, about 23,000 ft. Cost close to $700,000 with other waterworks extensions.

Pomona, Kan., has approved bond issue of $25,000 for pipe lines for water system and other waterworks installtaion, including elevated steel tank. Fund will be increased to $35,000 through Federal aid. Bids will be asked early in November. Paulette & Wilson, National Reserve Building, Topeka, Kan., and Farmers' Union Building, Salina, Kan., are consulting engineers.

Cambridge, Ohio, plans extensions in water pipe lines in Edgeworth and Bellevue Avenues. Cost about $42,000. Financing has been arranged through Federal aid. Work is scheduled to begin in November.

Toledo, Ohio, plans about 70,000 ft. for pressure water system from pumping station to be built on Lake Erie for new water source; also new 60-in. line for main supply from pumping station on Broadway to Bancroft Street and vicinity. This is part of waterworks and pipe line expansion project to cost about $3,300,000. Financing will be arranged through Federal aid. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., consulting engineer, has made surveys. W. G. Clark is city water engineer.

Francesville, Ind., plans pipe lines for water system; also other waterworks installation, including elevated steel tank and tower. Fund of $36,300 has been arranged through Federal aid. Charles H. Hurd, Architects' and Builders' Building, Indianapolis, is consulting engineer.

Jacksonville Utilities Commission, Jacksonville, Fla., plans pipe lines for extensions in pressure water system for fire protection service. Cost about $158,000, of which $41,000 is being secured through Federal aid.

Sherman, Tex., will close bids about Nov. 8 for pipe for water system; also for 750,000-gal. elevated steel tank and tower on Lewis Street, and other waterworks installation. Hawley, Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers. W. Morgan Works is city manager.

DePere, Wis., closes bids Nov. 4 for 3000 ft. of 6-in. centrifugal cast iron, bell and spigot, class 250, super-De Lavaud, or equivalent, in 18-ft. lengths, with fittings. H. J. Danen is city clerk.

Three Forks, Mont., plans ¾, 1 and 1½-in. pipe for extensions in water system. Fund of $58,000 has been arranged through Federal aid for this and other waterworks installation. F. F. Palmer, Forsyth, Mont., is consulting engineer.

Sacramento, Cal., has awarded 155 tons of 4, 6 and 8-in. pipe as follows: 115 tons to United States Pipe & Foundry Co., 40 tons to American Cast Iron Pipe Co.

Fresno, Cal., has awarded 500 tons of 4, 6, 8 and 10-in. pipe to United States Pipe & Foundry Co.

Tucson, Ariz., has awarded 345 tons of 4, 6 and 8-in. to Pacific States Cast Iron Pipe Co.

. . . *Pig iron business practically at standstill.*

BOSTON, Oct. 26.—The pig iron market is virtually at a standstill. One encouraging fact is that the decline in the New England melt has been checked, and quite a few foundries report a pickup in orders for castings. Current interest centers in higher freight rates allowed railroads by the Interstate Commerce Commission and the possible effect on the cost of pig iron.

. . . . NEW YORK. . . .

. . . Steel business shows no improvement in metropolitan area.

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. . . Spotty buying over remainder of year with upturn in January expected.

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. . . Stocks being reduced as consumption probably exceeds production.

NEW YORK, Oct. 26.—Another week has brought no improvement in steel business nor any positive signs that marked gains in demand are to be expected within the very near future. Steel companies are more or less resigned to the belief that business over the remainder of the year will be spotty and in small volume, but they hope for a substantial pick-up in January.

No immediate effect of importance on railroad purchases of steel is expected from the Interstate Commerce Commission's decision to permit higher freight rates on a list of selected commodities. In view of the fact that the amount the carriers will derive from these increases does not compensate for increased costs for materials and labor, it is believed that a renewal of railroad buying will await final decision on blanket freight rate increases which the railroads will now request.

The outlook for tin plate business over the remainder of the year is uncertain. Most of the can companies have large stocks, sufficient in some instances to carry them well into the first quarter. Whether in these circumstances they will place the anticipatory orders that are usual in the last two months of the year remains to be seen.

It appears certain that the amount of steel still remaining in the hands of consumers and jobbers is the crux of the situation so far as replenishment orders are concerned. Steel companies believe that these stocks are being reduced quite rapidly, basing this assumption that consumption, though greatly reduced in recent months, is larger than the present low volume of production.

Pig Iron

A further retrenchment of buying activity has been noticeable and new business at present is in negligible quantity. Foundry operations are spotty and generally tending downward. While no announcements have as yet been made concerning prices for the coming quarter, sentiment is generally inclined toward a renewal of current quotations, in line with the recent announcements covering steel. The status of the export market remains unchanged, with a limited amount of buying of small tonnages of varying analyses taking place. Prices on export iron appear firm, and, beyond the relinquishment of premiums, it is doubtful if any concessions have been granted. The supply position of iron abroad is notably easier and foreign buyers are more interested in prices than in shipping dates. This condition, combined with the fact that Belgian and French irons are readily available for export at from $3 to $4 below quotations here, has undoubtedly been influential in lowering the demand for iron to be shipped abroad. One thousand tons of Dutch iron and a small tonnage of India iron are scheduled to reach Newark during the week.

Plates and Sheets

New plate business remains at a low level, and the prospects are none too bright for the rest of the quarter. Railroad buying has been absent and none is looked for immediately. Refinery equipment manufacturers are reducing their inventories of steel and have made no commitments for some time. Steel for the new United States liner will be bought at Newport News, Va. Likewise, the steel for two battleships will be purchased through Washington and not through New York district offices, although the ships are to be built at Brooklyn and Philadelphia. The keel for the *North Carolina* is to be laid on Oct. 27 at the Brooklyn Navy Yard, the first of the two 35,000-ton ships to be started.

A refrigerator maker placed an order for a fair-sized tonnage of hot-rolled annealed, indicating that at least in one instance production was catching up with steel inventories.

It is encouraging to note the announcement of an $8,000,000 private housing project at Westfield, N. J., involving homes in the $10,000 to $20,000 class.

. . GREAT BRITAIN. .

. . . World steel boom appears to be passing.

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. . . Continental markets quiet, though Britain is still busy.

LONDON, Oct. 26 (*By Cable*)—Evidence is accumulating that the world steel boom is passing. The Continent has been hit by the loss of the Chinese market, but Britain is reported willing to take delivery of undelivered Chinese contracts.

British iron and steel works are busy. They are not yet affected by the world commodity slump, although fresh buying inevitably is quieter.

Pig iron is still scarce but additional supplies are coming in from France, Belgium, Canada and the United States which should relieve the famine. Meanwhile, Tees pig iron exports are curtailed. Supplies of semi-finished steel are becoming more adequate. British steel masters could dispose of all finished steel output on the home market but are endeavoring to keep export connections as far as possible.

A definite lull is evident in the Continental steel market. The cartel has ordered the reduction of the monthly export quotas from 525,000 metric tons to 450,000 tons.

. . PHILADELPHIA . .

. . . Miscellaneous buying better, but total is still discouraging.

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. . . District rate down two points to 52 per cent of capacity.

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. . . Year-end outlook none too satisfactory.

PHILADELPHIA, Oct. 26.—This market continues to move along drearily, deriving what little support it has from a scattered amount of hand-to-mouth buying of a volume which could hardly account for more than 35 per cent of the district's capacity. Many of the consumers here still have a fair amount of stock, and apparently have every intention of working down this inventory to an absolute minimum, hoping all the while that some event marketwise may develop in their favor. Mills here for the most part look for orders to improve slightly over the next month and then probably experience an additional holiday slump in December, which will be followed by considerably better demand in January.

Mill operations in this territory are being supported partly by current demand and partly by modest backlogs, both domestic and foreign. Nonetheless, the total volume of rolling orders is not sufficient to maintain last week's rate, and several plants have taken off open hearths. Phoenix, for one, has shut off its two units for repairs, but has hopes of relighting both next week. The average of district operations is off two points and now approximates 52 per cent of capacity.

There is no indication that railroads here consider the recent decision of the ICC granting them certain rate advances as of sufficient moment to justify any new construction, at least over the remainder of the year. Railroad buying currently is nil.

Even though the scrap market here continues to fall off, there are still some factors indicating confidence in the early 1938 market. Bids on the Government boats offered last Wednesday were considerably higher than current prices warrant, and English bids were on an average of $5 above domestic offers.

Pig Iron

With practically no new demand, sellers are engaged only in taking care of releases on old orders. The volume of backlogs has been cut into quite severely during the past two months, and the tonnage remaining on books is at the moment not very large. Furnace stocks are increasing slightly, but are far under the point where they would overhang and depress the market. There is considerable foreign inquiry going the rounds, but buyers and sellers are having difficulty in coming to an agreement on price. The volume of current inquiry indicates that a real desire exists abroad for American iron, and it is probable that the principals involved will shortly come to terms, at least for a moderate tonnage.

Plates and Shapes

Plate mills at local plants are operating slightly better than the sheet units, but the total lack of current demand for plates would indicate a decline in activity over the next fortnight. Makers can expect little more than a modicum of miscellaneous demand, as there is no indication that either the railroads or shipyards will be in the market over the remainder of the year. Current lettings of shapes are scarce and for small tonnages, although business in prospect for the first half of November includes some sizable projects. The only shapes award of the week called for 230 tons to Bethlehem for a Wilmington bank building, and new projects up for bidding include 1250 tons for industrial buildings at Lancaster, Pa., and 600 tons for a hospital at Torrance, Pa. There is practically no demand for reinforcing bars, although a new hospital at Norristown, Pa., to be bid Nov. 3, calls for about 1000 tons, and miscellaneous road work in New Jersey will account for about 500 tons of bars and mesh.

Sheets and Strip

There has been a marked increase in the number of orders from practically all outlets, but the aggregate volume of new business is little if any better than it has been for the past three weeks. Mills are able and willing to make spot deliveries for even small lots, and thus have made serious inroads into jobber and warehouse turnover. About the best sellers are hoping for is a gradual modest improvement over the remainder of the year, at least enough improvement to minimize dangers of price weakness.

Imports

The following iron and steel imports were received here during the past week: 1865 tons of chrome ore from Cuba; 1900 tons of chrome ore from South Africa; 1500 tons of manganese ore from British India; 1500 tons of manganese ore from Soviet Russia; 150 tons of ferromanganese from Norway; 18 tons of wire rods, 11 tons of steel billets and 40 tons of steel forgings from Sweden.

. . . CINCINNATI . . .

. . . Sheet sales gain moderately; ingot output lower.

CINCINNATI, Oct. 26.—Sheet demand turned upward in this area the past week. The leading district interest reports the best bookings in five weeks.

Steel ingot production has dropped further to about 44 per cent. Fifteen out of 34 open hearths are in operation this week.

Pig iron demand is disappointing. New business in small lots was less than in the preceding week, while specifications against contracts are lighter. A few foundries indicate slight improvement, but jobbing plants are still on restricted schedules.

. . . NON-FERROUS . . .

. . . *Domestic copper sales light.*

* * *

. . . *Zinc reduced further to 6.10c., New York.*

NEW YORK, Oct. 26.—A revival of European buying and a small but definite improvement in prices on the London Exhange has given new stability to the domestic copper market. Buying, however, continues light in the neighborhood of 900 tons per day. Electrolytic quotations are still split with metal being offered by one custom smelter at 12c. per lb., Connecticut Valley, and at 13c. per lb. by primary producers. Electrolytic prices in London this morning ranged between 11.00c. and 11.05c. per lb., c.i.f., usual Continental base ports, and were backed up with brisk buying interest. Copper sales for the week amounted to 4256 tons, bringing the total for the month to date up to 15,173 tons. Consumption at present is running around 50,000 tons per month, as against estimated sales of 21,000 for the same period.

Zinc

Prime Western prices on Monday were lowered $5 per ton to a basis of 6.10c. per lb., New York, in an effort to overcome the extreme cautiousness of buyers, but as yet the reduction has had no effect on the dull conditions currently prevailing in the market. This cut was the fourth in a month and brought spelter prices down $30 a ton from the price position of a month ago. Sales for the week totaled 721 tons of prime Western, as compared with 641 tons in the preceding week, and deliveries totaled 4325 tons. Undelivered stocks are slowly being liquidated and now stand at 73,419 tons. Prices in London stiffened slightly this morning and were between 3.70c. and 3.75c. per lb.

Lead

Better market sentiment and the lower prices established 10 days ago revived buying activity and sales for the past week were estimated to be 90 per cent above the previous week's total. Current buying is mostly for October delivery, which month is about 90 per cent covered. Very little interest is shown in November positions, the requirements of this month being about 40 per cent specified. Domestic quotations are unchanged at 5.50c. per lb., New York. Statistics for September show that although there has been a recession of 5919 tons in production, consumption has been better maintained, as deliveries were only 701 tons below the August figure. The final totals for September were 53,850 tons and 41,046 tons, for shipments and production respectively. Stocks dropped for the 15th consecutive month and now stand at 90,742 tons, or 12,766 tons below the August position.

Tin

Toward the end of the past week prices recovered somewhat from the 47.875c. level of last Tuesday, and reached 50.25c. on Thursday. From that point they receded slightly and leveled out at 48.50c. per lb., which was the quotation yesterday and today on Straits metal in New York. Consumers bought spasmodically on the declines, but the volume of sales was below the previous week.

The Week's Prices. Cents Per Pound for Early Delivery

	Oct. 20	Oct. 21	Oct. 22	Oct. 23	Oct. 25	Oct. 26
Electrolytic copper, Conn.*	12.00	12.00	12.00	12.00	12.00	12.00
Lake copper, N. Y.	13.125	13.125	13.125	13.215	13.125	13.125
Straits tin spot, New York	48.75	50.25	49.625	....	48.50	48.50
Zinc, East St. Louis	6.00	6.00	6.00	6.00	5.75	5.75
Zinc, New York	6.35	6.35	6.35	6.35	6.10	6.10
Lead, St. Louis	5.35	5.35	5.35	5.35	5.35	5.35
Lead, New York	5.50	5.50	5.50	5.50	5.50	5.50

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin, 99 per cent plus 20.00c.-21.00c. a lb., delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 18.25c. a lb., prompt, f.o.b., New York.
Antimony, American, 17.25c. per lb., prompt shipment, New York.
Quicksilver, $87.50 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 12.25c. a lb., less carload, delivered in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	49.00c. to 50.00c.
Tin, bar	51.00c. to 52.00c.
Copper, Lake	14.00c. to 15.00c.
Copper, electrolytic	14.00c. to 15.00c.
Copper, castings	13.75c. to 14.75c.
*Copper sheets, hot-rolled	21.125c.
*High brass sheets	19.25c.
*Seamless brass tubes	22.00c.
*Seamless copper tubes	21.875c.
*Brass rods	15.75c.
Zinc, slabs	7.75c. to 8.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	13.00c.
Lead, American pig	6.75c. to 7.75c.
Lead, bar	7.75c. to 8.75c.
Lead, sheets, cut	10.00c.
Antimony, Asiatic	19.50c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, ½ and ½	33.50c. to 34.50c.
Babbitt metal, commercial grade	25.00c. to 65.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 25 per cent allowed off for extras, except copper sheets and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	52.50c.
Tin, bar	54.50c.
Copper, Lake	14.00c. to 14.25c.
Copper, electrolytic	14.00c. to 14.25c.
Copper, castings	13.75c. to 14.00c.
Zinc, slabs	8.75c. to 9.00c.
Lead, American pig	6.00c. to 6.25c.
Lead, bar	9.50c. to 10.00c.
Antimony, Asiatic	18.00c. to 18.50c.
Babbitt metal, medium grade	20.25c.
Babbitt metal, high grade	56.50c.
Solder, ½ and ½	29.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.875c.	9.625c.
Copper, hvy. and wire	8.25c.	8.75c.
Copper, light and bottoms	7.25c.	7.50c.
Brass, heavy	4.625c.	5.25c.
Brass, light	4.00c.	4.75c.
Hvy. machine composition	7.50c.	8.00c.
No. 1 yel. brass turnings	5.75c.	6.25c.
No. 1 red brass or compos. turnings	7.25c.	7.75c.
Lead, heavy	4.50c.	4.875c.
Cast aluminum	11.125c.	12.25c.
Sheet aluminum	13.25c.	14.75c.
Zinc	3.50c.	3.875c.

IRON AND STEEL SCRAP

. . . All markets weaker as No. 1 steel falls $1 at Pittsburgh.

o o o

. . . Composite price now at $14.83; new low for the year.

OCT. 26.—Mill interest is still lacking and trading practically at a standstill, with prices largely nominal. What little activity there is gives further evidence of weakness in most markets. Based chiefly on brokers' offerings, the price for No. 1 heavy melting steel has been dropped $1 at Pittsburgh, and this fact plus declines of 25c. at Chicago and $1 at Philadelphia brings THE IRON AGE composite price down 75c. to $14.83. This new low for the year is $7.09 below the high level of $21.92 reached on April 6 and approximates the price prevailing in the middle of August, 1936.

Pittsburgh

The scrap market again shows weakness due to lack of business and the consistent decline in steel ingot operations. Several brokers who a week ago were willing to sell No. 1 heavy melting steel at $16 will now take $15.50 or even $15 a ton. However, buyers are still not interested even at these comparatively low prices. Although it is not thought that exceptionally large tonnages could be bought around $15.50, moderate sales could be made at this price. On the basis of brokers' offerings and the fact that some scrap has been covered as low as $15, No. 1 heavy melting is off $1 a ton, being quotable at $15 to $15.50. Adding support to this appraisal was the sale during the past week of a moderate tonnage of compressed sheets to a mill with a comparatively low freight rate at $15 a ton delivered. Other open-hearth and blast furnace grades have been marked down accordingly and railroad specialties continue to show weakness owing to lack of demand.

Chicago

Although trading is at a standstill, brokers' bids have dropped as low as $13.50 for No. 1 heavy melting steel in some instances while buying has been done with ease at $13.75. It is believed that no more than $14.25 can be obtained from a mill so the quotation this week is $13.75 to $14.25. Mill interest is completely lacking and shipments have been sharply curtailed. Sales to brokers have been reported as low as $13.50 and as high as $15 where prompt shipment was required.

Cleveland

With no consumer demand and little scrap being taken by leading consumers, prices have taken another drop of $1 a ton on steel making grades and 50c. a ton on blast furnace scrap. Youngstown prices have similarly declined. Large consumers in the Valley district who lifted restrictions on shipments a week ago had so much scrap come in that they again placed embargoes on shipments this week. There is some activity in foundry scrap and this has been sufficient to hold No. 1 cast to recent price levels.

Buffalo

The only important sale during the past week was a tonnage of mixed borings and turnings and clean cast borings, reported to have been made by a local dealer to a blast furnace consumer at $10.25. While most prices are nominal, the list has reached the point where dealers believe they can profitably lay down material and some of this is being done. Mills continue to hold up or restrict shipments. Dealers are not looking for the market to go a great deal lower, being of the opinion that higher freight rates, labor costs and taxation will prevent "$10 steel."

Cincinnati

Old materials are all but inactive. New business is nil, while shipments against contracts are fewer. Prices tend softer, but published rates are nominal. Dealers are wary of long position and little material is being attracted into the market. Yard supplies are fair.

Boston

Pittsburgh consumers having withdrawn from the market for turnings and blast furnace material, and exporters still deadlocked with vessel owners over increased space rates, there is less doing in scrap than at any previous time this year. One exporter, however, has a boat here loading 7700 tons for Rotterdam, but owing to the fact he has 200 cars of material on dock is buying nothing at the moment.

New York

No new orders are reported for domestic consumption and what is left on old orders is almost entirely cleaned up. Hence scrap movement is virtually at a standstill and prices on cars are nominal at best. It does not seem possible to move material at any price, as reflection of sentiment and in keeping with other markets quotations have been reduced $1 along the line. With the completion of an export order at a high price, the offerings on steel axles has been reduced $1.50. Buying prices on other grades of export scrap have been reduced 50c. as loadings continue at a slow pace with the restrictions on chartered vessels still in effect.

St. Louis

Scrap iron prices were marked down by dealers from 50c. to $2 a ton, and yet these quotations are merely nominal, because there is no buying. It has been several months since a mill in the St. Louis area has placed a sizable order, and dealers, who have cleaned up all of their back orders, are not buying. Offerings have been light as country dealers realize the weakness in the market and the low prices the material would bring. Mills are reducing their operations and have ample supplies for the business in hand. The Missouri-Pacific will sell a special list of 40 carloads this week.

Philadelphia

With steel-making operations continuing to slide off and all buying at a standstill, the scrap market has a sustained undertone of weakness. Prices on important grades are off from $1 to $2 a ton, entirely on sentiment alone, although there has been no test sales to establish these lower quotations. The 25 boats offered by the Government last Wednesday brought forth some interesting bids, generally on a level considerably higher than present scrap prices warrant. Only 22 of the boats were awarded and three were withheld; four boats went to Union Shipbuilding Co. and two to Hyman-Michaels Co. for scrapping in this country, and the latter firm secured two for scrapping abroad. British interests secured ten and Greek interests secured four. The prices paid by the British were about $5 a ton higher than those offered in this country, and thereby indicate the confidence the British have in the market about six months from now, when the scrap will be ready for the market.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.00 to $15.50
Railroad hvy. mltng.	16.50 to 17.00
No. 2 hvy. mltng. steel	13.50 to 14.00
No. 2 RR. wrought	15.00 to 15.50
Scrap rails	16.50 to 17.00
Rails 3 ft. and under	20.00 to 20.50
Comp. sheet steel	15.00 to 15.50
Hand bundled sheets	14.00 to 14.50
Hvy. steel axle turn.	13.50 to 14.00
Machine shop turn.	10.00 to 10.50
Short shov. turn.	11.00 to 11.50
Mixed bor. & turn.	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Cast iron carwheels	16.00 to 16.50
Hvy. breakable cast	13.00 to 13.50
No. 1 cupola cast	17.50 to 18.00
RR. knuckles & cplrs.	19.50 to 20.00
Rail coil & leaf springs	19.50 to 20.00
Rolled steel wheels	19.50 to 20.00
Low. phos. billet crops	19.50 to 20.00
Low phos. sh. bar	19.00 to 19.50
Low phos. punchings	17.50 to 18.00
Low phos. plate. hvy.	18.00 to 19.00
Low phos. plate clips	17.00 to 17.50
Steel car axles	19.50 to 20.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	12.50 to 13.00
Hydraulic bund., new	15.00 to 15.50
Hydraulic bund., old	11.50 to 12.00
Steel rails for rolling	19.00 to 19.50
Cast iron carwheels	18.00 to 18.50
Hvy. breakable cast	16.00 to 16.50
No. 1 cast	18.00 to 18.50
Stove plate (steel wks.)	13.50 to 14.00
Railroad malleable	17.50 to 18.50
Machine shop turn.	11.00 to 11.50
No. 1 blast furnace	10.00 to 10.50
Cast borings	10.00 to 10.50
Heavy axle turnings	13.00 to 13.50
No. 1 low phos. hvy.	22.50 to 23.00
Couplers & knuckles	22.00 to 22.50
Rolled steel wheels	22.00 to 22.50
Steel axles	23.00 to 23.50
Shafting	21.50 to 22.00
No. 1 RR. wrought	18.00 to 18.50
Spec. iron & steel pipe	15.00 to 15.50
No. 1 forge fire	15.00 to 15.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$13.75 to $14.25
Auto. hvy. mltng. steel alloy free	12.25 to 12.75
No. 3 auto. steel	10.25 to 10.75
Shoveling steel	13.75 to 14.25
Hydraul. comp. sheets	12.75 to 13.25
Drop forge flashings	10.75 to 11.25
No. 1 busheling	12.75 to 13.25
Rolled carwheels	17.00 to 17.50
Railroad tires, cut	17.50 to 18.00
Railroad leaf springs	17.50 to 18.00
Steel coup. & knuckles	18.00 to 18.50
Axle turnings	13.00 to 13.50
Coil springs	20.00 to 20.50
Axle turn (elec.)	14.00 to 14.50
Low phos. punchings	17.50 to 18.00
Low phos. plates, 12 in. and under	18.00 to 18.50
Cast iron borings	9.00 to 9.50
Short shov. turnings	8.75 to 9.25
Machine shop turn.	6.75 to 7.25
Rerolling rails	16.25 to 16.75
Steel rails under 3 ft.	17.25 to 17.75
Steel rails under 2 ft.	17.75 to 18.25
Angle bars, steel	15.75 to 16.25
Cast iron carwheels	16.25 to 16.75
Railroad malleable	15.00 to 15.50
Agric. malleable	12.50 to 13.00
	Per Net Ton
Iron car axles	$20.75 to $21.25
Steel car axles	19.75 to 20.25
No. 1 RR. wrought	11.75 to 12.25
No. 2 RR. wrought	12.00 to 12.50
No. 2 busheling, old	5.50 to 6.00
Locomotive tires	15.50 to 16.00
Pipes and flues	10.00 to 10.50
No. 1 machinery cast	12.50 to 13.00
Clean auto. cast	12.50 to 13.00
No. 1 railroad cast	11.50 to 12.00
No. 1 agric. cast	11.00 to 11.50
Stove plate	9.50 to 10.00
Grate bars	10.00 to 10.50
Brake shoes	10.00 to 10.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$16.00 to $16.50
Hydraulic bundles	15.00 to 15.50
Machine shop turn.	13.00 to 13.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	14.00 to 14.50
Comp. sheet steel	14.50 to 15.00
Light bund. stampings	11.00 to 11.50
Drop forge flashings	16.00 to 16.50
Machine shop turn.	9.50 to 10.00
Short shov. turn.	11.00 to 11.50
No. 1 busheling	14.00 to 14.50
Steel axle turnings	11.50 to 12.00
Low phos. billet and bloom crops	22.00 to 22.50
Cast iron borings	11.00 to 11.50
Mixed bor. & turn.	11.00 to 11.50
No. 2 busheling	10.50 to 11.00
No. 1 cast	19.00 to 19.50
Railroad grate bars	10.00 to 10.50
Stove plate	9.50 to 10.00
Rails under 3 ft.	19.00 to 19.50
Rails for rolling	17.00 to 17.50
Railroad malleable	17.00 to 17.50
Cast iron carwheels	19.50 to 20.00

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	13.00 to 13.50
Scrap rails	15.00 to 15.50
New hvy. b'ndled sheet	13.00 to 13.50
Old hydraul. bundles	12.00 to 12.50
Drop forge flashings	13.00 to 13.50
No. 1 busheling	13.00 to 13.50
Hvy. axle turnings	10.50 to 11.00
Machine shop turn.	9.00 to 9.50
Knuckles & couplers	18.00 to 18.50
Coil & leaf springs	18.00 to 18.50
Rolled steel wheels	18.00 to 18.50
Low phos. billet crops	19.00 to 19.50
Shov. turnings	11.50 to 12.00
Mixed bor. & turn.	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Steel car axles	18.00 to 18.50
No. 1 machinery cast	16.00 to 16.50
No. 1 cupola cast	15.00 to 15.50
Stove plate	13.00 to 13.50
Steel rails under 3 ft.	18.50 to 19.00
Cast iron carwheels	16.00 to 16.50
Railroad malleable	16.00 to 16.50
Chemical borings	12.50 to 13.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$14.50 to $15.00
No. 1 hvy. melting	14.50 to 15.00
No. 2 hvy. melting	13.00 to 13.50
No. 1 locomotive tires	17.00 to 17.50
Misc. stand.-sec. rails	14.50 to 15.00
Railroad springs	20.00 to 20.50
Bundled sheets	9.00 to 9.50
No. 1 busheling	10.50 to 11.00
Cast bor. & turn.	7.50 to 8.00
Rails for rolling	17.00 to 17.50
Machine shop turn.	7.50 to 8.00
Heavy turnings	11.50 to 12.00
Steel car axles	19.50 to 20.00
Iron car axles	21.50 to 22.00
No. 1 RR. wrought	10.00 to 10.50
No. 2 RR. wrought	14.00 to 14.50
Steel rails under 3 ft.	18.00 to 18.50
Steel angle bars	16.00 to 16.50
Cast iron carwheels	17.00 to 17.50
No. 1 machinery cast	13.25 to 13.75
Railroad malleable	15.00 to 15.50
No. 1 railroad cast	13.25 to 13.75
Stove plate	10.75 to 11.25
Agricul. malleable	11.00 to 11.50
Grate bars	11.25 to 11.75
Brake shoes	10.50 to 11.00

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$12.50 to $13.00
No. 2 hvy. mltng. steel	10.00 to 10.50
Scrap rails for mltng.	17.00 to 17.50
Loose sheet clippings	9.00 to 9.50
Hydrau. b'ndled sheets	13.00 to 13.50
Cast iron borings	7.00 to 7.50
Machine shop turn.	8.50 to 9.00
No. 1 busheling	11.00 to 11.50
No. 2 busheling	5.50 to 6.00
Rails for rolling	19.00 to 19.50
No. 1 locomotive tires	15.50 to 16.00
Short rails	19.50 to 20.00
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	13.00 to 13.50
No. 1 railroad cast	11.50 to 12.00
Burnt cast	8.00 to 8.50
Stove plate	8.00 to 8.50
Agricult. malleable	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Mixed hvy. cast	9.50 to 10.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	$16.00 to $16.50
Scrap steel rails	17.00
Short shov. turnings	8.50
Stove plate	10.50
Steel axles	18.00 to 19.00
Iron axles	15.50 to 18.00
No. 1 RR. wrought	13.00 to 15.00
Rails for rolling	18.00 to 20.00
No. 1 cast	16.00 to 18.00
Tramcar wheels	16.00 to 18.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$11.50 to $12.00
No. 2 hvy. mltng. steel	10.50 to 11.00
Borings and turnings	7.75 to 8.25
Long turnings	7.50 to 8.00
Short shov. turnings	9.00 to 9.50
No. 1 machinery cast	13.00 to 13.50
Automotive cast	14.00 to 14.50
Hvy. breakable cast	11.50 to 12.00
Hydraul. comp. sheets	13.00 to 13.50
Stove plate	8.50 to 9.00
New factory bushel	11.50 to 12.00
Old No. 2 busheling	8.00 to 8.50
No. 2 busheling (black fender stock)	Nominal
Sheet clippings	9.50 to 10.00
Flashings	11.50 to 12.00
Low phos. plate scrap	13.50 to 14.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$11.50 to $12.00
No. 2 hvy. mltng. steel	10.00 to 10.50
Hvy. breakable cast	12.00 to 12.50
No. 1 machinery cast	14.00 to 14.50
No. 2 cast	12.00 to 12.50
Stove plate	9.00 to 9.50
Steel car axles	23.50 to 24.00
Shafting	17.50 to 18.00
No. 1 RR. wrought	14.50 to 15.00
No. 1 wrought long	14.00 to 14.50
Spec. iron & steel pipe	12.00 to 12.50
Rails for rolling	16.50 to 17.00
Clean steel turnings	7.75 to 8.25
Cast borings	7.50 to 8.00
No. 1 blast furnace	6.00 to 6.50
Cast borings (chem.)	11.50 to 12.00
Unprepar. yard scrap	7.00 to 7.50

Per gross ton, delivered local foundries:

No. 1 machn. cast	$16.50 to $17.50
No. 1 hvy. cast cupola	13.50 to 14.00
No. 2 cast	13.00 to 13.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$14.80 to $15.30
Scrap rails	14.80 to 15.30
No. 2 steel	13.80 to 14.30
Breakable cast	13.00 to 13.50
Machine shop turn.	6.20
Mixed bor. & turn.	6.00
Bund. skeleton long	9.95
Shafting	18.00 to 18.25
Cast bor. chemical	9.00 to 10.00

Per gross ton delivered consumers' yards:

Textile cast	$17.00
No. 1 machine cast	17.00

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$14.00 to $15.00
No. 2 hvy. mltng. steel	11.50

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. stl.	$14.50	$14.00
No. 2 hvy. mltng. stl.	13.50	13.00
Mixed dealers steel	12.50	12.00
Scrap pipe	11.75	11.50
Steel turnings	9.75	9.50
Cast borings	11.00	10.50
Machinery cast	18.00	17.00
Dealers cast	16.00	15.00
Stove plate	13.00	11.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges.

No. 1 hvy. mltng. steel	$13.00 to $13.50
No. 2 hvy. mltng. steel	12.00 to 12.50
No. 2 cast	11.00
Stove plate	9.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	$15.75
No. 2 hvy. mltng. steel	14.75
Rails (scrap)	15.75

Philadelphia, delivered alongside boats, Port Richmond

No market at present.

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$37.00
Forging quality	43.00

Sheet Bars

F.o.b Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$37.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	2.10c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$47.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	48.00
F.o.b. Worcester, Mass.	49.00
F.o.b. Birmingham	50.00
F.o.b. San Francisco	56.00
F.o.b. Galveston	53.00

Rods over 9/32 in. to 47/64 in., inclusive, $5 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.45c.
F.o.b. Chicago or Gary	2.50c.
F.o.b. Duluth	2.60c.
Del'd Detroit	2.60c.
F.o.b. Cleveland	2.50c.
F.o.b. Buffalo	2.55c.
Del'd Philadelphia	2.74c.
Del'd New York	2.78c.
F.o.b. Birmingham	2.60c.
F.o.b. cars dock Gulf ports	2.85c.
F.o.b. cars Pacific Ports	3.00c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.30c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.35c.
F.o.b. Buffalo	2.40c.
F.o.b. Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.70c.
F.o.b. cars dock Pacific ports	2.85c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.55c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.60c.
Del'd Detroit	2.70c.
F.o.b. cars dock Gulf ports	2.95c.
F.o.b. cars dock Pacific ports	2.95c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.40c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.80c.
F.o.b. cars dock Pacific ports	2.80c.

Iron

F.o.b. Chicago	2.40c.
F.o.b. Pittsburgh (refined)	3.60c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.90c.
F.o.b. Cleveland, Chicago and Gary	2.95c.
F.o.b. Buffalo	3.00c.
F.o.b. Detroit	2.95c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago or Gary	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Coatesville or Spar. Pt.	2.35c.
Del'd Philadelphia	2.435c.
Del'd New York	2.53c.
F.o.b. Birmingham	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.
Wrought iron plates, f.o.b. Pittsburgh	3.80c.

Floor Plates

F.o.b. Pittsburgh	3.50c.
F.o.b. Chicago	3.55c.
F.o.b. Coatesville	3.60c.
F.o.b. cars dock Gulf ports	3.90c.
F.o.b. cars dock Pacific ports	4.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Buffalo or Bethlehem	2.35c.
Del'd Philadelphia	2.455c.
Del'd New York	2.5025c.
F.o.b. Birmingham (standard)	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Chicago or Buffalo	2.70c.
F.o.b. cars dock Gulf or Pacific Coast ports	3.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$42.50
Angle bars, per 100 lb.	2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton	$43.00
Light rails (from rail steel) per gross ton	42.00

	Base per Lb.
Spikes	3.15c.
Tie plates, steel	2.30c.
Tie plates, Pacific Coast ports	2.40c.
Track bolts, to steam railroads	4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.40c.
No. 10, f.o.b. Gary	2.50c.
No. 10, del'd Detroit	2.60c.
No. 10, del'd Philadelphia	2.69c.
No. 10, f.o.b. Granite City	2.60c.
No. 10, f.o.b. Birmingham	2.55c.
No. 10, f.o.b. cars dock Pacific ports	2.95c.
No. 10 wrought iron, Pgh.	4.25c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	3.15c.
No. 24, f.o.b. Gary	3.25c.
No. 24, del'd Detroit	3.35c.
No. 24, del'd Philadelphia	3.44c.
No. 24, f.o.b. Granite City	3.35c.
No. 24, f.o.b. Birmingham	3.30c.
No. 24, f.o.b. cars dock Pacific ports	3.80c.
No. 24, wrought iron, Pittsburgh	5.15c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	3.10c.
No. 10 gage, f.o.b. Gary	3.20c.
No. 10 gage, f.o.b. Detroit	3.30c.
No. 10 gage, del'd Philadelphia	3.39c.
No. 10, f.o.b. Granite City	3.30c.
No. 10 gage, f.o.b. Birmingham	3.25c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.70c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.55c.
No. 20 gage, f.o.b. Gary	3.65c.
No. 20 gage, del'd Detroit	3.75c.
No. 20 gage, del'd Philadelphia	3.84c.
No. 20, f.o.b. Granite City	3.75c.
No. 20 gage, f.o.b. Birmingham	3.70c.
No. 20 gage, f.o.b. cars, dock, Pacific ports	4.10c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.80c.
No. 24, f.o.b. Gary	3.90c.
No. 24, del'd Philadelphia	4.09c.
No. 24, f.o.b. Granite City	4.00c.
No. 24, f.o.b. Birmingham	3.95c.
No. 24, f.o.b. cars, dock, Pacific ports	4.40c.
No. 24, wrought iron, Pittsburgh	6.10c.

Electrical Sheets
(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.35c.
Armature	3.70c.
Electrical	4.20c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Base gage changed from 22 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions.
Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	4.10c.
F.o.b. Gary	4.20c.
F.o.b. cars, dock, Pacific ports	4.80c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.50c.
No. 20, f.o.b. Gary	3.60c.
No. 20, f.o.b. Granite City	3.70c.
No. 20, f.o.b. cars dock Pacific ports	4.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh, per lb.	3.30c.
No. 28, Gary	3.40c.
No. 28, f.o.b. Granite City	3.50c.
No. 28, cars dock Pacific ports, boxed	4.175c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.35
Standard cokes, f.o.b. Gary	5.45
Standard coke, f.o.b. Granite City	5.55

Above quotations practically the equivalent of previous quotations owing to new method of quoting, effective Jan. 1, 1937.

Special Coated Manufacturing Ternes

	Base per Box
F.o.b. Pittsburgh	*$4.65
F.o.b. Gary	* 4.75
F.o.b. Granite City	4.85

* Customary 7½ per cent discount in effect through 1936 discontinued as of Jan. 1, 1937.

Roofing Terne Plate
(F.o.b. Pittsburgh)
(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Hot-Rolled Hoops, Bands, Strip and Flats under ¼ in.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.40c.
All widths up to 24 in., Chicago	2.50c.
All widths up to 24 in., del'd Detroit	2.60c.
All widths up to 24 in., Granite City	2.60c.
All widths up to 24 in., Birmingham	2.55c.
Cooperage stock, Pittsburgh	2.50c.
Cooperage stock, Chicago	2.60c.

Cold-Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	3.20c.
F.o.b. Cleveland	3.20c.
Del'd Chicago	3.43c.
F.o.b. Worcester	3.40c.

* Carbon 0.25 and less.

Cold Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	3.20c.	3.40c.
Carbon	.51- .75	4.45c.	4.65c.
Carbon	.76-1.00	6.30c.	6.50c.
Carbon	Over 1.00	8.50c.	8.70c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.45c.
No. 20, Pittsb'gh or Cleveland	3.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Per Lb.
Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.75
Smoth coated nails	$2.75
Cut nails, carloads	$3.60

	Base per 100 Lb.
Annealed fence wire	$3.20
Galvanized fence wire	3.60
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column.	74
Single loop bale ties, base col.	63

Chicago and Andersen, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh, except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton over Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	52	31	¼ & ⅜	+13	+35
¼ to ⅜	55	38½	½	20	1½
½	59½	49	¾	26	8
¾	62½	53	1 & 1¼	30	14
1 to 3	64½	55½	1½	34	16½
			2	33½	16

Lap Weld

2	57	47½	2	26½	10
2½ & 3	60	50½	2½ to 3½	27½	12½
3½ to 6	62	52½	4	29½	16
7 & 8	61	50½	4½ to 8	28½	15
9 & 10	60½	50	9 to 12	24½	10
11 & 12	59½	49			

Butt Weld, extra strong, plain ends

⅛	50½	36½	¼ & ⅜	+14	+48
¼ to ⅜	52½	40½	½	21	4
½	57½	48½	¾	27	10
¾	61½	52½	1 to 2	34	17½
1 to 3	63	55			

Lap Weld, extra strong, plain ends

2	55	46½	2	29½	13½
2½ & 3	59	50½	2½ to 4	35	20½
3½ to 6	62½	54	4½ to 6	33½	19
7 & 8	61½	51	7 & 8	34½	19½
9 & 10	60½	50	9 to 12	28	15½
11 & 12	59½	49			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.46	$ 5.41
1¼ in. o.d.	13 B.W.G.	11.21	9.96
1½ in. o.d.	13 B.W.G.	12.38	11.00
1¾ in. o.d.	13 B.W.G.	14.09	12.51
2 in. o.d.	13 B.W.G.	15.78	14.02
2¼ in. o.d.	13 B.W.G.	17.60	15.63
2½ in. o.d.	12 B.W.G.	19.37	17.21
2¾ in. o.d.	12 B.W.G.	21.22	18.85
3½ in. od.	12 B.W.G.	22.49	19.98
3 in. o.d.	12 B.W.G.	23.60	20.97
4½ in. o.d.	10 B.W.G.	45.19	40.15
3½ in. o.d.	11 B.W.G.	29.79	26.47
4 in. o.d.	10 B.W.G.	36.96	32.83
5 in. o.d.	9 B.W.G.	56.71	50.38
6 in. o.d.	7 B.W.G.	87.07	77.35

Extra for less-carload quantities:

40,000 lb. or ft. or over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	$55.00
6-in. and larger, del'd New York	53.00
*6-in. and larger, Birmingham.	47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	56.00
F.o.b. dock, Seattle	56.00
4-in. f.o.b. dock, San Francisco or Los Angeles	59.00
F.o.b. dock, Seattle	59.00

Class "A" and gas pipe, $3 extra. 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46, Birmingham, and $54 delivered Chicago; and 4-in. pipe, $49, Birmingham, and $58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. x 6 in. and smaller	65 and 5*
Larger and longer up to 1 in.	60 and 10*
1⅛ in. and larger	60 and 5*
Lag bolts	60 and 10*
Plow bolts, Nos. 1, 2, 3 and 7	65 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
⅛ in. and smaller	65
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon nuts, U.S.S. and S.A.E.:	
½ in. and smaller	60 and 10
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60
Stove bolts in packages, nuts attached	70
Stove bolts in packages, with nuts separate	70 and 10
Stove bolts in bulk	80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	$3.60
F.o.b. Chicago or Birmingham	3.70

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh	65 and 5
F.o.b. Cleveland	65 and 5
F.o.b. Chicago and Birmingham	65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more.)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.

Base price, $60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	3.00c.
Delivered, Detroit	3.15c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½% Nickel)	$0.35
2100 (1½% Nickel)	0.75
2300 (3½% Nickel)	1.55
2500 (5% nickel)	$2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	2.90
3400 Nickel-chromium	3.30
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum).	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum).	0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo, 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.35
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.35

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2¼ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	80c.
High-carbon-chrome	42c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£20 Nominal
Tin plate, per base box	23s. 9d. to 24s. 3d.
Steel bars, open-hearth	£11
Beams, open-hearth	£11 2s. 6d.
Channels, open-hearth	£11 7s. 6d.
Angles, open-hearth	£11 2s. 6d.
Black sheets, No. 24 gage	£15
Galvanized sheets, No. 24 gage	£18 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	£4 7s. 6d.
Wire rods, No. 5 B.W.G.	£6 15s.
Steel bars, merchant	£6 to £6 5s.
Sheet bars	£4 3s. 6d.
Plate ¼ in. and up.	£6 17s. 6d. to £7
Plate 3/16 in. and 5 mm.	£7 2s. 6d.
Sheet, ⅛ in.	£8 3s. 6d.
Beams, Thomas	£5 2s. 6d.
Angles (Basic)	£6 2s. 6d.
Hoops and strip, base	£7 to £7 5s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Per Net Ton
Plates	3.70c.
Structural shapes	3.70c.
Soft-steel bars and small shapes	3.80c.
Reinforcing steel bars	3.80c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No. 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bundles	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$4.48
Spikes, large	1 to 24 kegs 3.90c.
	Per Cent Off List
Track bolts, all sizes per 100 count	55
Machine bolts, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	$4.35
Wire, black, soft ann'l'd, base per 100 lb.	3.45c.
Wire, galv. soft, base per 100 lb.	3.85c.
Common wire nails, per keg	3.00c.
Cement coated nails, per keg	3.00c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

* Delivered in Pittsburgh switching district.

** Prices on application.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-rolled annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	$4.40
Track bolts (keg lots)	5.05
Rivets, structural (keg lots)	**4.95
Rivets, boiler (keg lots)	**5.05
	Per Cent Off List
Machine bolts and carriage bolts, ½ in. and smaller	60
Lag screws	*55 and 5
Hot-pressed nuts, sq. and hex., tap or blank, ½ by 6 in. and smaller	60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	$4.55
Com. wire nails, 15 kegs or more, per keg	$3.20
Cement c't'd nails, 15 kegs or more, per keg	$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

* These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

** Base at 100 lb.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	4.00c.
Structural shapes	3.97c.
Soft steel bars, round	4.12c.
Iron bars, Swed. charcoal	7.25 to 7.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.57c.
Flats and squares	4.57c.
Cold-rolled strip, soft and quarter hard	3.92c.
Hoops	4.32c.
Bands	4.32c.
Hot-rolled sheets (No. 10)	4.00 to 4.07c.
Hot-rolled ann'l'd sheets (No. 24*)	4.50 to 4.32c.
Galvanized sheets (No. 24*)	4.50 to 5.47c.
Long terne sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.60c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.40c.
Deep drawing	6.05c.
Stretcher leveled	6.05c.
SAE, 2300, hot-rolled	7.82c.
SAE, 3100, hot-rolled	6.37c.
SAE, 6100, hot-rolled, annealed	10.52c.
SAE, 2300, cold-rolled	9.00c.
SAE, 3100, cold-rolled, annealed	8.35c.
Floor plate, ½ in. and heavier	5.60c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.25c.
Wire, galv. (No. 9)	4.60c.
Tire steel, 1 x ½ in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, base per keg	3.25c.
	Per Cent Off List
Machine bolts, square head and nut: All diameters. Prices on application	
Carriage bolts, cut thread: All diameters. Prices on application	

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.99c.
Bars, soft steel (rounds and flats)	4.09c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.24c.
Cold-fin. rounds, shafting, screw stock	4.54c.
Hot-rolled annealed sheets (No. 24)	4.84c.
Galv. sheets (No. 24*)	5.49c.
Hot-rolled sheets (No. 10)	4.09c.
Black corrug. sheets (No. 24*)	4.89c.
2 galv. corrug. sheets	5.54c.
Structural rivets	5.29c.
Boiler rivets	5.39c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	50
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	60

* No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.90c.
*Structural shapes	3.90c.
*Soft steel bars, small shapes, iron bars (except bands)	4.00c.
‡Reinforc. steel bars, sq. twisted and deformed	3.53c.
Cold-finished steel bars	4.53c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	4.10c.
*Spring steel	5.50c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	5.30c.
*Hot-rolled annealed sheets (No. 10)	4.00c.
*Diam. pat. floor plates, ¼ in.	5.25c.

These prices are for delivery in Philadelphia trucking area.

* Base prices subject to deduction on orders aggregating 4000 lb. or over.

† For 25 bundles or over.

‡ For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.86c.
Soft steel bars	3.76c.
†Reinforc. steel bars	2.60c.
‡Cold-finished steel bars	4.30c.
Hot-rolled strip, 6 in. wide and under	4.16c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.66c.
Galvanized sheets (No. 24)	5.31c.
Hot-rolled sheets (No. 10)	3.91c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.91c.
Floor plates, 3/16 in. and heavier	5.76c.
*Black ann'l'd wire, per 100 lb.	$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95
	Per Cent Off List
Machine and carriage bolts, small	65 and 5
Large	60 and 10
Nuts, 100 count	
½ in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 10

† Outside delivery 10c. less.

* For 5000 lb. or less.

‡ Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.95c.
Floor plates	5.55c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reinforc. bars	3.75c.
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$3.48
Com. wire nails, base per keg:	
Any quantity less than carload	3.20
Cement c't'd nails, base 100-lb. keg	3.50
Chain, lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$21.80
4-in.	52.45
Lap-welded steel boiler tubes, 2-in.	20.73
4-in.	48.41

BUFFALO

	Base per Lb.
Plates	3.92c.
Floor plates	5.52c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.10c.
Cold-fin. flats and sq.	4.35c.
Rounds and hex.	4.35c.
Cold-rolled strip steel	3.79c.
Hot-rolled annealed sheets (No. 24)	4.80c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.97c.
Galv. sheet (No. 24)	5.45c.
Bands	4.22c.
Hoops	4.22c.
Heavy hot-rolled sheets	3.97c.
Com. wire nails, base per keg	$3.26
Black wire, base per 100 lb. (2500-lb. lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON

	Base per Lb.
Channels, angles	4.20c.
Tees and zees, under 3"	4.45c.
H beams and shapes	4.07c.
Plates — Sheared, tank and univ. mill, ¼ thick and heavier	4.08c.
Floor plates, diamond pattern	5.13c.
Bar and bar shapes (mild steel)	4.20c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.40 to 5.40
Half rounds, half ovals, ovals and bevels	5.45c.
Tire steel	5.45c.
Cold-rolled strip steel	3.845c.
Cold-finished rounds, squares and hexagons	4.65c.
Cold-finished flats	4.65c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	5.05c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.49c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.35c.
Hot-rolled annealed sheets (No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)*	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.78c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.

*Under 400 lb., .50c. over base, 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c; 3500 lb. and over, base less 15c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.86c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.96c.
Soft steel bars, squares and hexagons	4.11c.
Hot-rolled strip	4.21c.
Hot-rolled annealed sheets (No. 24)	4.71c.
Galvanized sheets (No. 24)	5.36c.
Cold-finished steel bars	4.41c.
Structural rivets (keg lots)	5.16c.
Boiler rivets, cone head (keg lots)	5.26c.
Track spikes (keg lots)	4.61c.
Track bolts (keg lots)	5.81c.
Black annealed wire (No. 6 to No. 9 incl.)	4.05c.
Com. wire nails and cement coated nails 1 to 14 kegs	3.25c.

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller or shorter	65
Larger and longer up to 1 in., diam.	60-5
1⅛ in. and larger	60
Coach and lag screws	60-5
Hot-pressed nuts, sq. and hex. tapped or blank, 1-199 lb.	50
200 lb. and over:	
½ in. and smaller	62½
9/16 to 1 in.	60
1⅛ in. and over	50

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.55c.
Hot-rolled annealed sheets, No. 24	4.35c.
Galvanized sheets, No. 24	5.50c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BIRMINGHAM

Bars and bar shapes	$3.85 base	
Structural shapes and plates	3.75 "	
Hot rolled sheets No. 10 ga.	3.80 "	
Hot rolled sheets No. 24 ga.	4.40 "	3500 lb. and over
Galvanized sheets No. 24 ga.	5.05 "	3500 lb. or more
Strip	4.05 "	
Reinforcing bars	3.85 "	
Floor plates	5.96 "	
Cold finished bars	4.91 "	
Machine and carriage bolts	.50 & 10 off list	
Rivets (structural)	$4.60 base	

On plates, shapes, bars, hot rolled strip, heavy hot rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons	3.16c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates ¼ in. and heavier	5.50c.
Galvanized sheets, No. 24, 100 bdls. or more	$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb. All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

	Base per Lb.
Mild steel bars	4.21c.
Iron bars	4.21c.
Reinforcing bars	4.21c.
Reinforcing shapes	4.11c.
Plates	4.11c.
Hot-rolled sheets No. 10	4.16c.
Hot-rolled annealed sheets, No. 24*	4.06c.
Galvanized sheets No. 24*	4.76c.
Steel bands	4.41c.
Cold-finished bars	4.86c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	4.31c.
Shapes, bar size	4.31c.
Iron bars	4.31c.
Structural shapes	4.21c.
Plates	4.21c.
Hot-rolled sheets, No. 10	4.26c.
Hot-rolled annealed sheets, No. 24	4.91c.
Galvanized sheets, No. 24	5.66c.
Steel bands	4.56c.
Cold-drawn rounds	4.80c.
Cold-drawn flats, squares, hexagons	6.80c.
Structural rivets	5.15c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	$3.55
Bolts and nuts, per cent off list	60

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.05c.	4.30c.	4.35c.
Shapes, standard	4.05c.	4.30c.	4.35c.
Soft steel bars	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.975c.	2.975c.	3.625c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.85c.	5.55c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.70c.	5.90c.
Cold-finished steel Rounds	6.80c.	6.85c.	7.10c.
Squares and hexagons	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carload	$3.65	$3.60	$3.70

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$54.00
First quality, New Jersey	56.00
Select, Ohio	49.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	8.00

5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$54.00
Chicago District	63.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester	$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	42.00
Domestic, f.o.b. Chewelah, Wash.	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F. o.b. Everett, Mass. $25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md. 25.00
Delivered Brooklyn 27.27
Delivered Newark or Jersey City 26.39
Delivered Philadelphia 25.76
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill. 24.00
F.o.b. Jackson, Ohio 25.75
Delivered Cincinnati 24.07
F.o.b. Duluth 24.50
F.o.b. Provo, Utah 22.00
Delivered San Francisco, Los Angeles or Seattle 26.50
F.o.b. Birmingham* 20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass. $25.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md. 24.50
F.o.b. Buffalo 23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill. 23.50
Delivered Cincinnati 24.51
Delivered Canton, Ohio 24.76
Delivered Mansfield, Ohio 25.26
F.o.b. Jackson, Ohio 25.50
F.o.b. Birmingham 19.00

Bessemer

F.o.b. Everett, Mass. $26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa. 26.00
Delivered Boston Switching District 26.50
Delivered Newark or Jersey City 27.39
Delivered Philadelphia 26.76
F.o.b. Buffalo and Erie, Pa., and Duluth 25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago .. 24.50
F.o.b. Birmingham 25.00
Delivered Cincinnati 25.51
Delivered Canton, Ohio 25.76
Delivered Mansfield, Ohio 26.26

Low Phosphorus

Basing points: Birdsboro, Pa. Steelton, Pa., and Standish, N. Y. $28.50

Gray Forge

Valley or Pittsburgh furnace ... $23.50

Charcoal

Lake Superior furnace $27.00
Delivered Chicago 30.04

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75 .... $26.50
No. 2 fdy., sil. 1.75 to 22.25 .... 25.50
Malleable 26.00
Basic 25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75 .... $27.50
No. 2 fdy., sil. 1.75 to 2.25 .... 27.00
Malleable 27.50
Basic 27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $102.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% $33.00
F.o.b. New Orleans 33.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads) $69.50
50% (ton lots) 77.00
75% (carloads) 126.00
75% (ton lots) 136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50% $27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50% $33.50
10.51 to 11.00% 34.00
11.01 to 11.50% 34.50
11.51 to 12.00% 35.00
12.01 to 12.50% 35.50
12.51 to 13.00% 36.00
13.01 to 13.5%0 ..... 36.50
13.51 to 14.00% 37.00
14.01 to 14.50% 37.50
14.51 to 15.00% 38.00
15.01 to 15.50% 38.50
15.51 to 16.00% 39.00
16.01 to 16.50% 39.50
16.51 to 17.00% 40.00

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally $1.80
Ferrotungsten, lots of 5000 lbs., nominally 1.85
Ferrotungsten, smaller lots, nominally 1.90
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract ..... 10.50c.*
Ferrochromium, 2% carbon ..... 16.50c to 17.00c.*
Ferrochromium, 1% carbon ..... 17.50c. to 18.00c.*
Ferrochromium, 0.10% carbon ..... 19.50c. to 20.00c.*
Ferrochromium, 0.06% carbon ..... 20.00c. to 20.50c.*
Ferrovanadium, del. per lb. contained V. ..... $2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y. $2.50*
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton $142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton $157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 63.50
Ferrophosphorus, electric, 24% in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn. 80.00
Ferromolybdenum, per lb. Mo del ..... 95c.
Calcium molybdate, per lb. Mo del ..... 80c.
Silico spiegel, per ton, f.o.b. furnace, carloads $45.00
Ton lots or less, per ton 50.00
Silico-manganese, gross ton, delivered.
3% 101.50
2.50% carbon grade 106.50
2% carbon grade 111.50
1% carbon grade 121.50

* Spot prices are $5 a ton higher. Spot premium on 75 per cent ferrosilicon is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50% $5.25
Old range, non-Bessemer, 51.50% 5.10
Mesabi, Bessemer, 51.50% 5.10
Mesabi, non-Bessemer, 51.50% .. $4.95
High phosphorus, 51.50% 4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal. 17.00c.
Iron, low phos., Swedish, average, 68½% iron ..... Nominal
Iron, basic or foundry, Swedish, aver. 65% iron ..... Nominal
Iron, basic or foundry, Russian, aver. 65% iron ..... Nominal
Man., Caucasian, washed 52% ..... 50c.
Man., African, Indian, 44-48% ..... Nominal
Man., African, Indian, 49-51% ..... Nominal
Man., Brazilian, 46 to 48½% ..... Nominal

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered ..... Nominal
Tungsten, domestic, scheelite delivered $30.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton:
South African (low grade) $16.00
Rhodesian, 45% 23.00
Rhodesian, 48% 26.50
Turkish, 48-49% .... 25.50 to $26.50
Turkish, 45-46% .... 23.50 to 24.00
Turkish, 44% ..... 19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:
50% ..... $25.50 to $26.50
48-49% ..... 24.50 to 25.00

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail $20.00
Domestic, barge and rail 21.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines 22.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid 24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines 31.50

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate ..... 5.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial ..... 5.25c.
Del'd Ch'go, No. 3 industrial 4.15c.
Del'd Ch'go, No. 5 industrial 4.00c.
Del'd Cleve'd, No. 3 distillate 5.75c.
Del'd Cleve'd, No. 4 industrial 5.75c.
Del'd Cleve'd, No. 5 industrial 5.00c.

COKE AND COAL

Coke *Per Net Ton*

Furnace, f.o.b. Connellsville, Prompt ..... $4.25 to $4.50
Foundry, f.o.b. Connellsville, Prompt ..... 5.00 to 6.25
Foundry, by-product, Chicago ovens 10.25
Foundry, by-product, del'd New England 12.50
Foundry, by-product, del'd Newark or Jersey City ..... 10.85 to 11.30
Foundry, by-product, Philadelphia 10.60
Foundry, by-product, delivered Cleveland ... 11.00
Foundry, by-product, delivered Cincinnati ... 10.50
Foundry, Birmingham .. 7.50
Foundry, by-product, del'd St. Louis industrial district ..... 11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports 14.75

Coal *Per Net Ton*

Mine run steam coal, f.o.b. W. Pa. mines ... $1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa. ..... 1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines ..... 2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines ..... 1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines ..... 1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines ..... 1.20 to 1.45

Machine Tool Builders Discuss Problems

(CONTINUED FROM PAGE 89A)

or two years or perhaps longer between two competitors, one of which received early regulation and the other in which regulation was deferred because of the physical inability of the board to get around to it.

Illustrating the difference between objectives of the New Deal and the methods employed to attain them, Mr. Emery cited the case of the youth who possessed the worthy objective of aiding his indigent parent but who chose as a method of so doing to hold up a citizen and relieve him of his pocketbook.

At the Monday afternoon session, Dr. Lewis Haney, of New York University, spoke on "The Business Horizon." We will have no real and sustained recovery, in his opinion, until the prevailing public attitude prejudicial to savings and investment is changed.

At this session also, Kenneth Condit, editor of *American Machinist*, speaking on obsolescence of machine tools, gave the results of his 1937 survey on tools 10 years or older and still in use. The present showing is 61 per cent in this class as compared with 65 per cent in 1935, with 48 per cent in 1930 and with 44 per cent in 1925.

Igor Sikorsky, engineering director, Sikorsky Aircraft Division of United Aircraft Corp., addressed the machine tool builders on Monday evening on "Aviation and its future."

A. C. Danekind, of General Electric Co., Schenectady, N. Y., and Ralph E. Flanders, president Jones & Lamson Machine Co., Springfield, Vt., were the speakers at the third session on Tuesday morning. Mr. Danekind spoke on "Man Power and Machine Tools," and Mr. Flanders on "The Maintenance of Ethical Standards."

"Planning for efficient operation of machine tools today requires careful consideration of manpower," said Mr. Danekind. "This has been brought about by the complete evolution in design, purchase and operation methods which has taken place in the past decade. The basic cause of this evolution is the refinement in accuracy which followed the Ford changeover to model A and which confronted machine tool builders with the necessity of producing tools capable of securing advance precision standards with semi-skilled labor. These requirements, of course, have now spread throughout all of the basic tool using industries. Due to this evolution, the human factor has become much more important in connection with machine operation and is further emphasized by the new attitudes of labor and labor groups which have developed under the New Deal. Today skill must be evaluated in terms of the job and the yardstick must be more exact."

Mr. Flanders sketched the development of the accepted code of principles which found expression in the N.M.T.B.A. code and later in the NRA code of the industry. It is particularly important, in Mr. Flanders' opinion, to maintain these accepted principles under the strain of temporary reverses in the general long term uptrend which is commonly expected.

Lewis M. Lind, chief of the Machinery Division, Department of Commerce, also spoke at this session on the subject of export classifications for machine tools.

Frank R. Kent, vice-president the Baltimore *Sun*, was the banquet speaker on Tuesday evening. His subject was "Politics and Personalities."

At the fourth session on Wednesday morning, the foreign situation will be discussed by C. R. Burt, Erik Oberg and Thorvald S. Ross, all of whom have recently returned from abroad.

A.S.T.E. to Form Metropolitan Chapter

AN organization meeting for the purpose of forming a Metropolitan chapter of the American Society of Tool Engineers is scheduled for Nov. 1 at Essex House, Newark, N. J. This group will be the 16th chapter formed, the 15th being the Baltimore chapter chartered on Oct. 14. Ford R. Lamb, executive secretary of the society, and other national officers from Detroit will outline the aims of the society and will install the officers to be elected at the meeting. The local committee is composed of Herbert D. Hall, Vandyck Churchill Co.; John Cetrule, Triplex Machinery Co.; B. C. Brosheer, *American Machinist*; and Frank J. Oliver, THE IRON AGE. Mr. Oliver, who is acting secretary, will be chairman of the meeting.

Foundry Equipment Business Improves

VOLUME of business reported by members of the Foundry Equipment Manufacturers' Association convening Oct. 18 at White Sulphur Springs, W. Va., was approximately 72 per cent higher in the first nine months of 1937 than in the like period of 1936. Castings makers were reported at the gathering as finding the immediate outlook spotty.

Highlights in the association's convention were discussions of increasing expenses, the maximum hour, minimum wage legislation pending in Congress and the shortage of skilled labor. Among the speakers was Herbert S. Simpson, president, National Engineering Co., Chicago, who discussed high taxes levied against Illinois companies.

Officers of the association, which voted to hold fall and spring meetings hereafter, as well as the annual meeting in February, are president, E. S. Hammond, Whiting Corp., Chicago; vice-president, H. S. Hershey, C. O. Bartlett & Snow Co., Cleveland; executive secretary, Arthur J. Tuscany, Tuscany, Turney and Associates, Cleveland.

Foundrymen Hear Cost Data Report

ONE hundred members of the Steel Founders' Society of America met at Hot Springs, Va., last week, to hear recommendations of its cost committee that they adopt a uniform cost system in order to "establish intelligent competition in the industry."

"The only differences in costs that should occur are those caused by varying degrees of proficiency in foundry operations," the committee, headed by Harold S. Falk, Falk Corp., Milwaukee, reported.

The committee urged the foundrymen to figure their costs so that every sale produced a reasonable profit.

The Steel Founders' Society also heard reports from a committee engaged in devising a standard, comprehensive list of steel scrap classifications that can be used in reporting purchase prices in the association's reports.

Criticising the minimum wage-hour measure now pending in Congress, the foundry association declared that "this type of legislation is not in the interests of industry, the wage earner, the consuming public or the nation as a whole."

Among speakers at the convention were F. A. Lorenze, Jr., president of the society, and James A. Emery, general counsel, National Association of Manufacturers.

FABRICATED STEEL

. . . Lettings in good volume at 23,400 tons compared with 5500 tons last week.

o o o

. . . New projects advance to 32,500 tons from 14,000 tons a week ago.

o o o

. . . Plate awards total 1870 tons.

NORTH ATLANTIC STATES

Kittery, Me., 100 tons, State bridge, to American Bridge Co.

Richmond, Me., 264 tons, State bridge, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

New York, 13,025 tons, Bronx-Whitestone bridge, contract WB-4, to American Bridge Co.

New York, 1190 tons, 19-story apartment building, 100 Riverside Drive, to Lehigh Structural Steel Co., Allentown, Pa.

New York, 1010 tons, 18-story apartment building, 964 Fifth Avenue, to Lehigh Structural Steel Co.

New York, 135 tons, six-story apartment building, corner 65th Street and Third Avenue, to Grand Iron Works, Inc., New York.

New York, 240 tons, alterations Interzone Corp. building, Maiden Lane, to Ingalls Iron Works Co., Birmingham.

New York, 205 tons, New York Central viaduct, West 10th Street to Charles Street, to Harris Structural Steel Co., Plainfield, N. J.

New York, 530 tons, 17-story apartment building, 230 Central Park South, to Belmont Iron Works, Philadelphia.

Brooklyn, 1200 tons, addition to Manual Training High School, to Lehigh Structural Steel Co.

Queens, N. Y., 880 tons, municipal garage, to Dreier Structual Steel Co., New York.

Buffalo, 180 tons, All Saints Catholic Church, to Buffalo Structural Steel Co.

Buffalo, 110 tons, Lang Bakery, Inc., building alterations, to R. S. McManus Steel Construction Co., Buffalo.

Chautauqua County, N. Y., 610 tons, bridge, to Bethlehem Steel Co.

State of New York, 130 tons, route marker supports, to American Bridge Co.

Lewisburg, Pa., 185 tons, gymnasium, to Lehigh Structural Steel Co.

Amcello, Md., 220 tons, Celanese Corp., to Belmont Iron Works.

Wilmington, Del., 230 tons, addition to Delaware Trust Co. building, to Bethlehem Steel Co.

SOUTH AND SOUTHWEST

Mineral County, W. Va., 150 tons, Fort Ashby bridge, to Fort Pitt Bridge Works Co., Pittsburgh.

Cumberland, Va., 140 tons, bridge, to Fort Pitt Bridge Works Co., Pittsburgh.

Grant County, Ky., 155 tons, bridge, to Virginia Bridge Co., Roanoke, Va.

Colquitt-Cook Counties, Ga., 190 tons, bridge, to Taylor Iron Works & Supply Co., Macon, Ga.

Aragon, Ga., 150 tons, addition to Aragon Mills, to Ingalls Iron Works Co.

El Paso, Tex., 490 tons, S. S. Kress store, to Austin Brothers, Dallas, Tex.

Yuma, Ariz., 100 tons, gold saving tables, to Herrick Iron Works.

CENTRAL STATES

Toledo, 200 tons, building for Libbey-Owens-Ford Glass Co., to Mississippi Valley Structural Steel Co., St. Louis.

Decatur, Ind., 180 tons, General Electric Co. building, to International Steel Co., Evansville, Ind.

Springfield, Ill., 250 tons, International Harvester Co. plant, to Gage Structural Steel Co., Chicago.

Keokuk, Iowa, 150 tons, Poiree Dam trestles, Mississippi River locks, to Worden-Allen Co., Milwaukee.

WESTERN STATES

Denver, 526 tons, overcrossing at East 46th Street, to Bethlehem Steel Co.

Denver, 135 tons, building for Montgomery Ward Co., to Midwest Steel & Iron Works Co., Pueblo, Colo.

Ridgway, Colo., 110 tons, State highway bridges, to Midwest Steel & Iron Works Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Northampton, Mass., 3000 tons, Calvin Coolidge bridge.

Westchester-Putnam Counties, N. Y., 10,770 tons, West Branch-Kensico section, Delaware aqueduct; bids to Board of Water Supply, New York, until Nov. 9. Contract includes 43 tons cast iron, 95 tons wrought iron and 13 tons cast steel.

New York, 1060 tons, viaduct, 135th Street-Lincoln Avenue, Bronx; bids Oct. 28.

Canaseraga, N. Y., 180 tons, Central school; bids Nov. 5.

Claverack, N. Y., 800 tons, State highway bridge.

Phoenix, N. J., 140 tons, building, Chemical Construction Corp.

Pittsburgh, 110 tons, Whitaker Paper Co.

Torrance, Pa., 600 tons, hospital; bids Nov. 3.

SOUTH AND SOUTHWEST

Winifrede Junction, W. Va., 250 tons, State overpass.

Arlington, Va., 400 tons, Bell Telephone Co. building.

Louisville, Ky., 300 tons, underpass.

Shubuta, Miss., 280 tons, highway project.

Brownsville, Tex., 250 tons, mill building.

Roswell, N. M., 140 tons, State bridge over Pecos River.

Roswell-Vaughn, N. M., 100 tons, State bridge, project FAP-180-C.

CENTRAL STATES

Detroit, 3600 tons, baseball stadium, Briggs Field, for Detroit Baseball Club.

Detroit, 350 tons, factory near Mound Road and Eight Mile Road.

Dearborn, Mich., 4000 tons, plates and shapes, blast furnace for Ford Motor Co.; Arthur G. McKee & Co., Cleveland, engineers and contractors.

Mount Pleasant, Mich., 150 tons, State highway bridge.

Youngstown, 170 tons, blast furnace cast house, for Republic Steel Corp.

Adams County, Ohio, 185 tons, bridge; bids Nov. 9.

Adams County, Ohio, 220 tons, State highway bridge, readvertised; bids Nov. 8.

Cambria, Ill., 250 tons, bridge.

St. Louis, 700 tons, Frisco bridge repairs.

WESTERN STATES

Lamar, Colo., 400 tons, State highway bridge.

Denver, 140 tons, two highway bridges; bids opened.

Missoula, Mont., 428 tons, State highway bridge; bids Nov. 5.

Cheyenne, Wyo., 355 tons, State highway construction; bids opened.

Powder River, Wyo., 290 tons, State bridge over Powder River.

Los Angeles, 550 tons, Union Pacific bridge over Los Angeles River.

Bonneville Dam, Ore., 400 tons, miscellaneous requirements.

Skagit County, Wash., 390 tons, Skagit River bridge; bids Nov. 2.

HAWAII

Honolulu, 1500 tons, five buildings for Hawaiian Pineapple Co.

FABRICATED PLATES

AWARDS

Corpus Christi, Tex., 1750 tons, tanks for General American Tank Storage Terminal Co., to Wyatt Metal & Boiler Works, Dallas, Tex.

Chicago, 120 tons, plates, navy pier, to R. C. Mahon Co., Detroit.

NEW PROJECTS

Westchester-Putnam Counties, N. Y., 800 tons, interliners, West Branch-Kensico section, Delaware aqueduct; bids to be received by Board of Water Supply, New York, until Nov. 9.

San Francisco, 1000 tons, 60-in. steel pipe line between Sunset Reservoir and Seventh Avenue; Williams Bros. & Haas, Inc., low bidders on general contract.

SHEET PILING

NEW PROJECTS

Westchester-Putnam Counties, N. Y., 238 tons, West Branch-Kensico section, Delaware aqueduct; bids until Nov. 9 by Board of Water Supply, New York.

NIAGARA
BRAND
FERRO – ALLOYS

For High Quality Steels

FERRO SILICON
ALL GRADES

FERRO CHROMIUM
HIGH CARBON

FERRO CHROMIUM
LOW CARBON

FERRO MANGANESE

SILICO MANGANESE

PITTSBURGH METALLURGICAL CO., Inc.

NIAGARA FALLS, N. Y.

Sales Offices: NEW YORK—30 Church St. ● PITTSBURGH—Oliver Bldg. ● CLEVELAND—Hanna Bldg.

THIS WEEK'S MACHINE . . . TOOL ACTIVITIES . . .

. . . Adverse sentiment has affected machinery sales only slightly.

o o o

. . . October order volume showing small decline, and inquiries are being maintained.

o o o

. . . Fiat buying machinery here for Italian automobile factory.

Detroit

CONSIDERABLE improvement in inquiries and orders for small equipment and perishable tools has been accompanied by inquiries and orders for a large variety of equipment for foreign markets. Outstanding is the program of the Fiat Co., Italy, for equipment to be installed in a large new automotive plant. Other interests actively in the market are said to be Russian and Czechoslovakian, the latter reputed to be preparing for the manufacture of a small automobile. Twenty large machine grinders estimated to cost $20,000 to $30,000 were ordered by Russian buyers at one Michigan manufacturing plant.

Chicago

MOST machinery salesmen here report a decline in business which has been evident to some degree for the past two months. Deliveries are improving somewhat in most lines, although two sellers see no change in their picture. One sales agency expects October business to exceed that of September, and, judging from inquiries on hand anticipates an even better November. The outlook expressed generally, however, is that orders will come in more slowly over the remainder of the year. Most of the activity on the part of buyers is seen among the farm implement and tractor makers, whose capacity operations are continuing unchanged. Deliveries are particularly extended on punch presses, planers, boring mills, and almost any large machine. Smaller tools, though in good demand, are more easily obtained.

Cleveland

THE trend in the demand for machine tools still is downward and October will make a very poor showing in the volume of orders. Inquiry has dropped off and some pending business has been held up because of the uncertainty regarding developments in the business situation during the next few months. The only reported activity in the railroad field is the purchase of a 52-in. vertical boring mill by the New York Central Railroad for its Collinwood-Cleveland shops. While no large export business is pending at present, scattered foreign orders continue to come out.

Following a lull for a few days, demand for presses picked up the past week. The Ford Motor Co. will purchase 500 large automobile body presses for its new press shop in Detroit. Inquiry for these is expected to come out any day. The Kelsey-Hayes Wheel Co. will require 50 to 60 presses for its new Pittsburgh district plant. It is reported that the Hall Lamp Co., Detroit, will enlarge its plant requiring additional press equipment. There are reports in the machinery trade to the effect that the International Harvester Co. will postpone its expansion program until next year.

Cincinnati

THE machine tool market is without noticeable feature. Current business is still slow, the past week producing a slight decrease from the preceding period. Potential demand, however, is still large, inquiry being markedly brisk. Buyer reluctance to make large financial commitments in the face of reported uncertainties in the national picture is believed to be the deterring factor in current business. Foreign demand is brisker on the aggregate than domestic, although the latter is producing greater volume. Orders from several foreign powers are recorded, but the amount is undisclosed.

Production is being maintained at a market average of about 70 per cent of capacity. Backlogs are being rapidly reduced although there is still sufficient business on the books to hold operations steady through this quarter.

New York

SENTIMENT is much worse than business in the Metropolitan area. While a mournful dirge is heard from Wall Street and lack of confidence in the Administration is widely expressed by business men, there has been no general holding up of commitments for new machinery. Principal reason, perhaps, is that the only logical way to offset higher costs is by cost cutting—and modern machinery seems to be the only answer. In fact, the preponderance of equipment purchased in recent months has been for replacement purposes on the basis of savings in cost of production. This does not mean to imply that machinery sales are booming. When the final tallies are in, October may well prove to be below September in volume, but the decline, if any, will be slight. Dealers and factory representatives continue to make quotations in volume, and the outlook for the final quarter is encouraging, even though much of this equipment is on 1938 budgets. Backlogs at machine tool factories, as a result of large foreign commitments, continue large and there has been no appreciable improvement in delivery promises. Foreign inquiries continue active.

Pittsburgh

INQUIRIES continue fairly steady and involve a general run of tools rather than any specific item. Orders show little change in volume from a few weeks ago with some projects still being held up pending clarification of present business sentiment. While the recent freight increases granted the railroads might result in better orders from that source, it is not expected that activity along this line will materialize before the first of the year. Meanwhile, the railroads insist that a general freight rise in addition to those specific commodity increases already granted is needed to offset increased costs, major one of which involves labor. Steel mill equipment plants are busy but there has been a slight falling off in miscellaneous bookings.

C. R. Hook Praises U. S. System

THE American or incentive economic system is responsible for this country's "high standard of living and unequalled national progress," Charles R. Hook, president, American Rolling Mill Co., recently told the American Life Insurance Convention at Chicago.

"When you look at your alarm clock you see only the hands and the figures on the dial," said Mr. Hook. "You do not see the main spring, or that tiny motor deep down inside. Destroy it and the hands stop. There is a mainspring deep down inside America, the incentive to work and create, to share in the profits of one's work."

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Johns-Manville Corp., 22 East Fortieth Street, New York, insulation products, building materials, etc., has let general contract to Joshua H. Marks-Charde Co., 816 West Fifth Street, Los Angeles, for new branch plant on 50-acre tract at Los Angeles, consisting of two main one-story units, 100 x 700 ft., and 100 x 310 ft., latter with wing extension, 60 x 90 ft. Larger part of plant will be used for production of transite pipe products. Cost close to $1,000,000 with machinery. Stone & Webster Engineering Corp., Boston, and 601 West Fifth Street, Los Angeles, is engineer; Albert C. Martin, Higgins Building, Los Angeles, is consulting architect.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, has begun one-story addition to branch plant at Charlotte, N. C. Cost over $85,000 with equipment.

Universal Joint Service, Inc., New York, recently organized to manufacture automotive parts, has leased space in building at 243 West Sixty-eighth Street for plant.

Canada Dry Ginger Ale, Inc., 100 East Forty-second Street, New York, plans new one-story and basement mechanical-bottling plant at Dallas, Tex., where site has been selected. Cost close to $100,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 2 for electro-hydraulic boat crane equipment, including hoisting and rotating machinery, with control equipment and spare parts (Schedule 1896), two whistle valves, with controls and spare parts (Schedule 1912) for Brooklyn Navy Yard.

New York City Tunnel Authority, Room 1009, 200 Madison Avenue, New York, Alfred B. Jones, chairman, asks bids until Nov. 16 for 23 blower fans, 23 exhaust fans, 82 electric motors and 82 transmissions for ventilating system of Queens Midtown Tunnel.

Contracting Officer, Quartermaster Corps, Fort Slocum, N. Y., asks bids until Nov. 1 for unions, tees, elbows, copper tubing, etc. (Proposal 842-14).

Monarch Retinning Co., Jersey City, N. J., has leased 40,000 sq. ft. of floor space in building at 184-98 Pacific Avenue; about 18,000 sq. ft. in Building O of Boynton Furnace Co., Whiton Street, and part of industrial building at 278 Johnston Avenue, for plant units.

SKF Steels, Inc., 369 Lexington Avenue, New York, has leased one-story building at 110 Frelinghuysen Avenue, Newark, N. J., totaling about 10,000 sq. ft., for new factory branch, storage and distributing plant. Company will remove branch plant from Hartford, Conn., where building has been sold, to new location.

Signal Property Officer, Signal Corps, Fort Monmouth Laboratories, Oceanport, N. J., asks bids until Nov. 2 for one horizontal shaper and vertical slotter (Circular 10).

Continental Can Co., 100 East Forty-second Street, New York, has arranged for sale of new issue of preferred stock, totaling about $19,354,500, part of proceeds to be used for expansion and improvements in plants in different parts of country.

Board of Education, 500 Park Avenue, New York, plans new vocational school at Bedford Avenue and North Twelfth Street, Brooklyn, primarily for instruction in automobile mechanics, including repairs, maintenance, etc. Cost reported over $150,000 with equipment.

Amisco Wire Products Co., Ridgefield, N. J., manufacturer of wire goods, has purchased factory of American Musical Supply Co., 441-53 Communipaw Avenue, Jersey City, N. J., comprising two one-story buildings on site 118 x 211 ft., for plant.

Hess Welded Ship & Barge Corp., Philadelphia, recently organized, has acquired former shipbuilding plant of William Cramp & Sons Ship & Engine Building Co., for production of welded steel motor-driven barges for oil and other transportation. New owner will make improvements and use two of eight shipways for initial operations, placing other ways in service later. Joseph Sinex is vice-president and general manager.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Nov. 1 for hobs (Circular 354); until Nov. 2, four head turning and trimming machines (Circular 361), 25,855 heat-treated, aluminum alloy forgings, and 25,855 naval brass forgings, half-hard (Circular 355); until Nov. 3, one small pinion bench checking unit (Circular 362).

Carpenter Steel Co., River Road, Reading, Pa., plans one-story addition to Building No. 31, 76 x 83 ft., including extension in crane runway. Cost close to $45,000 with equipment. Muhlenberg, Yerkes & Muhlenberg, Ganster Building, are architects.

BUFFALO DISTRICT

Eastman Kodak Co., Rochester, N. Y., has acquired property adjoining Hawk-Eye Works for five-story addition, about 80,000 sq. ft. of floor space, for which superstructure will begin before close of year. Cost over $250,000 with equipment. As previously reported, company also will build a six-story and basement addition at main camera plant, about 300,000 sq. ft. floor space, to cost $600,000 with equipment.

Haeberle Lumber Co., 1004 Cedar Avenue, Niagara Falls, N. Y., plans rebuilding machine shop and wood-working plant recently destroyed by fire. Loss about $50,000 with machinery.

United Shoe Machinery Corp., 126 Mill Street, Rochester, N. Y., plans one-story addition and improvements in present plant. Cost over $60,000 with equipment. Main offices of company are at Boston.

NEW ENGLAND

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Nov. 1 for gages, plug, check, flush pin, thread ring types, etc. (Circular 51), one portable arc welding set, with motor-generator and accessories (Circular 53).

City Council, Lewiston, Me., plans new municipal hydroelectric generating plant on Lake Auburn, including transmission line to city. Fund of $102,600 has been secured through Federal aid for project.

Whitney Blake Co., Dixwell Avenue, New Haven, Conn., manufacturer of insulated wire and cable, plans one-story addition. Cost over $100,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 2 for one motor-driven, metal-cutting band saw (Schedule 1916), one electric furnace, air circulating type (Schedule 1935) for Boston Navy Yard; one motor-driven surface grinder (Schedule 1957) for Newport, R. I., Naval Station; eight pneumatic motor hoists, trolley type, each 2000 lb. capacity (Schedule 1918) for Portsmouth, N. H., Navy Yard.

Firestone Tire & Rubber Co., Akron, Ohio, has purchased former mill of American Printing Co., Fall River, Mass., textile printer, and will remodel for production of rubber specialties. It will be operated by Firestone Rubber & Latex Co.

SOUTH ATLANTIC

Nehi Bottling Co., 540 N.W. Twenty-fourth Street, Miami, Fla., has filed plans for two-story addition to mechanical-bottling works, 41 x 55 ft. Cost about $40,000 with equipment. George L. Pfeiffer and Girard Pitts, 35 S.E. First Avenue, are architects; L. B. Taylor, Congress Building, is consulting engineer.

United States Engineer Office, Savannah, Ga., asks bids until Nov. 17 for four oil-fired sectional header, watertube, cross-drum, marine-type boilers, with oil burners, soot blowers, fittings, tools and spares; four units to have total heating surface not less than 12,000 sq. ft., and gage pressure of 200 lb. per sq. in. (Circular 82).

WASHINGTON DIST.

Purchasing and Contracting Officer, Signal Corps, Base Signal Office, Langley Field, Va., asks bids until Nov. 18 for five 125 ft. steel vertical towers and necessary ground net, radio frequency feeders, tower warning lights, etc., at Big Bethel Military Reservation (Proposal 1).

Mason Canning Co., Pocomoke City, Md., canner and packer of food products, plans rebuilding part of plant recently destroyed by fire. Loss close to $50,000 with equipment.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Nov. 1 for one lift-truck and four lift-truck platforms (Circular 122).

General Purchasing Officer, Panama Canal, Washington, asks bids until Nov. 1 for three metal-cutting lathes and extra equipment, one milling machine and extra equipment, one sliding-head drill, one power hacksaw, one single surfacer, one buffer, one hollow chisel mortiser, one wood shaper, one wood shop drill, one scroll saw, one belt sander, one oilstone grinder, one saw filer, one manually-operated spot welder, one hand router, one portable electric drill, one arbor press, one wood trimmer, one testing machine, one hardness testing tool attachment, one blacksmith forge, one electric-operated heat-treatment furnace, three combination gas-burning bench furnaces (Schedule 3296); until Nov. 5, one wood-working machine, three 10-cu. ft. concrete mixers, one 7-cu. ft. concrete mixer, wrenches, pipe bends and other equipment (Schedule 3297). Majority of machines to be motor driven.

Frankfort Distilleries, Inc., 200 North Kresson Street, Baltimore, has let general contract to Consolidated Engineering Co., 20 East Franklin Street, for one-story steam power house. Cost close to $45,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 2 for one motor-driven drilling and tapping machine (Schedule 1917), one motor-driven exhauster and one air filter (Schedule 1931) for Norfolk, Va., Navy Yard; two steering systems, with electrical and mechanical equipment and spare parts (Schedule 1911) for Boston and Charleston, S. C., yards.

SOUTHWEST

Seven-Up Co., 215 East Twenty-seventh Street, Kansas City, Mo., beverages, has leased a one-story building, 115 x 160 ft., to be erected at Eighteenth Street and Burlington Avenue by North Kansas City Development Co., Commercial Building, for new mechanical-bottling plant. Cost about $115,000, of which $75,000 will be expended for equipment.

Board of Education, McPherson, Kan., plans manual training department in new two-story and basement high school, for which bids will be received on general contract until Nov. 15. Cost about $307,000.

Lörentz Schmidt, 1805 East Second Street, Wichita, Kan., is architect.

Ralston Purina Co., 835 South Eighth Street, St. Louis, cereal products, has asked bids on general contract for eight-story and basement addition, 72 x 200 ft., and for six-story top addition to present two-story building. Cost over $250,000 with equipment. Mauran, Russell, Crowell & Mulligardt, Chemical Building, are architects; Joseph A. Osborn, Syndicate Trust Building, is mechanical engineer.

Barnsdall Oil Co., Tulsa, Okla., plans new natural gasoline plant in Foster oil district, near Fort Worth, Tex., with compressor station, power house and other facilities. Steel tank storage and distributing division will be built. Cost over $100,000 with equipment.

St. Clair Foods, Inc., 5002 Swiss Street, Dallas, Tex., has let general contract to Harry M. Bigger, McAllen, Tex., for two-story canning plant at McAllen, 75 x 110 ft. Cost over $55,000 with equipment.

Commanding Officer, Ordnance Department, San Antonio Arsenal, San Antonio, Tex., asks bids until Nov. 8 for one universal cutter, tool and drill grinder, with self-contained motor-drive, with accessories (Circular 7).

Common Council, Caldwell, Tex., plans municipal butane gas system, with tanks, pipe lines and operating facilities. Bond issue of $42,000 has been authorized. Joseph J. Rady, Majestic Building, Fort Worth, Tex., is consulting engineer.

Kansas Electric Power Co., Lawrence, Kan., plans new steam-electric generating station at Cameron Bluff, near city, including 10,000-kw. turbo-generator unit, high-pressure boilers and auxiliary equipment. Work is scheduled to begin early next year. Cost close to $1,000,000. Sargent & Lundy, 140 South Dearborn Street, Chicago, are consulting engineers.

Frutex Laboratories, Inc., Brownsville, Tex., C. A. Brania, general manager, plans new winery, comprising several one-story units. Cost over $65,000 with machinery.

SOUTH CENTRAL

Greenville Seating Co., Greenville, Miss., has plans for new two-story plant for production of steel-framed seating equipment for schools, theaters, etc., including foundry for cast iron seat frames, and division for cutting and forming parts, and for assembling. Cost close to $50,000 with equipment.

Louisville Compress Co., Louisville, Miss., plans rebuilding cotton compress plant recently destroyed by fire. Loss close to $350,000 with compressing machines, mechanical-handling and other equipment.

Standard Oil Co. of Louisiana, Inc., St. Charles Avenue, New Orleans, has filed plans for bulk oil storage and distributing plant on One Mile Creek, Mobile, Ala., including tanks, loading racks, pumping machinery and other equipment. Cost over $60,000. Company also is considering new bulk plant at State Docks, Mobile, with tank division and other structures. Cost over $200,000.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Nov. 4 for two 27,000-kva. electric generators with auxiliary equipment, for station at Guntersville, Ala.

Coca-Cola Bottling Co., Opelika, Ala., has let general contract to Batson-Cook Co., West Point, Ga., for two-story addition for mechanical bottling. Cost about $50,000 with equipment. Francis P. Smith, Norris Building, Atlanta, Ga., is architect.

WESTERN PA. DIST.

Raymond Mfg. Co., 226 South Center Street, Corry, Pa., manufacturer of steel springs and kindred products, plans one-story addition, about 35 x 95 ft. Cost close to $40,000 with equipment.

McCann-Shields Paint Co., 27 Alexander Avenue, Pittsburgh, has plans for two-story factory. Cost about $60,000 with equipment. Herbert H. Cahoon, 337 Boulevard of Allies, is architect.

MICHIGAN DISTRICT

Barkley-Grow Aircraft Corp., Penobscot Building, Detroit, manufacturer of airplanes and parts, has let general contract to Joseph A. Krausmann Co., 1460 East Jefferson Street, for one-story plant addition and improvements in present units. Cost close to $45,000 with equipment.

Ford Motor Co., Dearborn, Mich., has let general contract to Albert A. Albrecht Co., Penobscot Building, for one-story plant at Milford, Mich., for parts production. Cost over $100,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

State Refining Co., Grand Rapids, Mich., plans erection of new skimming type oil refinery near city. Cost close to $90,000 with equipment.

American Brass Co., 174 South Clark Street, Detroit, has let general contract to J. A. Utley, 6031 Mansur Street, for extensions and improvements in local plant. Cost over $50,000 with equipment.

Sealed Power Corp., Muskegon, Mich., manufacturer of pistons, piston rings and kindred engine equipment, has let general contract to Strom Construction Co., Grand Rapids, Mich., for one-story addition, for expansion in foundry, and for storage and distribution, respectively. Cost over $40,000 with equipment.

Chippewa Brewing Co., Manistee, Mich., has work under way on one-story mechanical-bottling division. Cost about $55,000 with equipment.

OHIO AND INDIANA

National Cylinder Gas Co., 205 West Wacker Drive, Chicago, manufacturer of industrial oxygen, acetylene gas, etc., has let general contract to Campbell-Lowrie-Lautermilch Corp., 400 West Madison Street, for new one-story plant at Ivorydale, Cincinnati. Cost close to $100,000 with equipment.

Brown-Manley Plow Co., McConnellsville, Ohio, agricultural implements, has let general contract to Frankenburg Construction Co., 8 East Long Street, Columbus, Ohio, for one-story addition, 50 x 55 ft. Cost close to $40,000 with equipment.

Weldon Tool Co., 321 Frankfort Avenue, Cleveland, has asked bids for remodeling and improving property at 300 Woodhill Road, recently taken over for new plant.

Contracting Officer, Materiel Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Nov. 1 for gage assemblies, taper gage wrench assemblies and crankshaft spline gages (Circular 349); until Nov. 4, 90 magneto assemblies (Circular 352); until Nov. 11, 3233 oxygen regulator assemblies (Circulars 332 and 334); until Nov. 12, drift meter assemblies in lots of 30 to 60, and lots of 100 to 260, respectively (Circular 339); until Nov. 13, 315 starter assemblies (Circular 334).

John Deere Plow Co., 216 South Senate Street, Indianapolis, agricultural machinery and implements, has filed plans for one and two-story factory branch, storage and distributing plant, totaling about 100,000 sq. ft. of floor space. Cost close to $200,000 with equipment.

MIDDLE WEST

Caspers Tin Plate Co., 4100-24 West Forty-second Place, Chicago, has taken out a permit for new one-story mill, 60 x 233 ft., at 4146-50 Karlov Avenue, for which general contract has been let to Poirot Construction Co., 2001 West Pershing Road. A. Epstein, last noted address, is architect and engineer.

Mechanics Universal Joint Co., Eighteenth Avenue, Rockford, Ill., manufacturer of automobile transmissions, universal joints, etc., has let general contract to Sjostrom & Sons, Inc., 1617 Crosby Street, for one-story plant, 390 x 600 ft., with power house, 60 x 100 ft., at Harrison Avenue and Twentieth Street. Cost about $500,000 with equipment. Peterson & Johnson, Swedish-American Bank Building, are architects.

Gardner-Denver Co., 1727 East Thirty-ninth Avenue, Denver, manufacturer of pumping machinery and parts, air compressors, engines, etc., has plans for one-story machine shop, 30 x 138 ft. Cost over $45,000 with equipment. Main offices are at Quincy, Ill.

Common Council, Emmetsburg, Iowa, asks bids until Nov. 1 for a municipal gas plant, including tanks, regulators, meters, pipe lines, etc. Gas Service & Engineering Corp., 3615 Olive Street, St. Louis, is consulting engineer.

United States Engineer Office, Post Office Building, Chicago, asks bids until Nov. 12 for control station with machinery and electrical systems at Peoria lock and dam, Illinois River, including hand-operated traveling bridge crane, water storage tank and piping, two electric-operated tow-haulage units complete, fuel oil supply equipment, two vertical oil pressure pumps with unloader and motor complete, hydropneumatic accumulator with automatic check valve, hydraulic oil piping with strainer and oil tanks, valves, high-pressure air system, gasoline-electric standby power unit, lock lighting system transformers and regulators, portable lighting units, signal control equipment and complete auxiliary electrical and mechanical equipment (Circular 43).

J. I. Case Co., Racine, Wis., manufacturer of industrial and farm tractors, agricultural implements, etc., is considering plans by Frank J. Hofman, local architect, 201 Sixth Street, for shop addition, 128 x 513 ft., for manufacturing and heat treating tractor gears. Final decision as to proceeding with construction and equipment awaits determination of costs.

Independent Milwaukee Brewery, 2701 South Thirteenth Street, Milwaukee, will start work shortly on additions to various departments. Cost $75,000 to $100,000, including equipment, tanks, etc.

Barlow & Seelig Mfg. Co., Ripon, Wis., manufacturer of domestic laundry machines, has plans by Auler & Jensen, architect, Equitable Reserve Building, Oshkosh, Wis., for factory addition requiring considerable metal-working equipment. Work may not start until early spring.

PACIFIC COAST

Escondido Orange Association, Escondido, Cal., plans three-story addition to packing plant, to be used as a mechanical precooling unit. Cost about $175,000 with machinery. Gay Engineering Corp., 2730 East Eleventh Street, Los Angeles, is engineer.

Board of Education, 1151 South Broadway, Los Angeles, has engaged Marsh, Smith & Powell, Architects' Building, architects, to prepare plans for one-story vocational shop at Hollywood high school, 1521 North Highland Avenue. Cost about $60,000 with equipment.

Bellingham Bottling Works, Inc., 1121 Railroad Avenue, Bellingham, Wash., has let general contract to Pearson & Thomas, Lakeway Drive, for one-story mechanical-bottling unit. Cost close to $40,000 with equipment.

Pilot Rock Milling & Mfg. Co., Pilot Rock, Ore., care of J. R. Ervin, Pilot Rock, president, recently organized, plans one-story machine shop, power house, pumping station and other units at new woodenware plant. Cost close to $100,000 with machinery. R. J. Brack, Pendleton, Ore., is vice-president.

W. C. Lovelace, Visalia, Cal., plans rebuilding fruit dehydration plant recently destroyed by fire. Loss about $55,000 with equipment.

International Smelting & Refining Co., Kearns Building, Salt Lake City, Utah, has approved plans for new flotation mill at Ophir, Utah, mining properties for handling about 600 tons of crude ore per day. Cost over $500,000 with machinery. Erection will be carried out by company forces.

Lodi Grammar School District, Lodi, Cal., has asked bids on general contract for addition to Needham school, including vocational shop unit. Cost over $150,000 with equipment. Peter Sala, 2130 North Commerce Street, Stockton, Cal., is architect.

FOREIGN

Midgley & Sons, Ltd., Sheffield, England, manufacturer of iron, steel and metal alloy products, plans additions for production of aluminum specialties, a new line of output, to include furnaces and other units. Cost over $200,000 with equipment.

International Harvester Co., 606 South Michigan Avenue, Chicago, has acquired over 40 acres at Geelong, Victoria, Australia, for new plant for production of agricultural machinery and implements, including parts production and assembling. Cost close to $1,500,000 with equipment.

Canadian Atlas Steels, Ltd., Main Street East, Welland, Ont., has let general contract to Standard Steel Construction Co., Ltd., Port Robinson, Ont., for one-story addition, 85 x 275 ft. Cost over $90,000 with equipment.

The Manufacture, Characteristics and Uses of Magnesium Castings*

By W. G. HARVEY
American Magnesium Corp.

o o o

THE metal for magnesium sand castings is generally melted in gas or oil fired steel pots of 100 to 400 lb. capacity. A charge consists of approximately 97 per cent of metal and 3 per cent of a salt flux which prevents the oxidation of the metal and also refines and cleanses the molten metal from non-metallic impurities. The main portion of the flux lies at the bottom of the pot, but a thin film floats on the metal surface.

Magnesium at around its melting point of 1204 deg. F. reacts with water vapor, and castings cannot be made successfully in green sand molds. Inhibitors or sand addition agents must be incorporated to prevent this reaction. These are of various types and comprise such materials as powdered sulphur, boric acid, ethylene glycol, ammonium fluoride or combinations of these. Only a small amount of the inhibitor is necessary and its use allows sufficient water to be added to the sand to furnish satisfactory molding qualities. These chemicals in effect produce inert atmospheres in the mold and protect the metal while in the molten condition. Because of the gases produced, a molding sand of high permeability is required. For the best results this is prepared synthetically by mixing a properly graded silica sand with bentonite.

Because of the lightness and the lower hydrostatic pressure which are available to force the molten metal into the thinnest cavities of the mold, a larger number of gates and risers is required than for aluminum, and all of these should be higher and of greater cross-section than in ordinary foundry practice. They have their effect on cost through increase in the ratio of metal melted and poured to casting weight, and in addition the trimming cost is proportionally increased.

Alloys and Mechanical Properties

Standard casting alloys in use today contain 85 per cent or more of magnesium with varying amounts of aluminum or aluminum and zinc. All these standard alloys also contain approximately 0.1 to 0.3 per cent of manganese. This component improves the stability and appears to benefit the yield strength.

Nominal Composition of Magnesium Casting Alloys—Per Cent

Alloy Number	Al	Zn	Mn	Mg
AM240	10.0	..	0.2	Balance
AM265	6.0	3.0	0.2	Balance
AM246	12.0	..	0.1	Balance
AM241	8.0	..	0.3	Balance

All these alloys are amenable to heat treatment with improvement in mechanical properties and all except AM241 can also be aged. The mechanism of heat treatment, properly called solution heat treatment, consists of causing the intermetallic compounds to go into solid solution by holding the castings for a period of time at an elevated temperature, followed by quenching. A further change in the mechanical properties is obtained by precipitating the solute constituents to a predetermined extent. This is termed "aging" and is accomplished by holding the heat-treated castings at about 350 deg. F. for a period of time. In general, the tensile strength and elongation are improved by heat treatment and the yield strength and hardness by aging.

The shrinkage of the casting alloys is about 11/64 in. per ft. This value compares so closely to the 5/32 in. per ft. used for aluminum alloys that pattern equipment built for the latter can be used satisfactorily. Compared generally, magnesium alloy cannot be cast in as light sections as the aluminum alloys, 5/32 in. being the thinnest section which can be commercially cast in magnesium unless the areas of thinner sections are small or so positioned as to allow adequate gating.

Design Considerations

Magnesium cast alloys, especially in the heat-treated form, exhibit excellent tensile properties and fatigue resistance but are sensitive to conditions producing local stress concentrations. They are satisfactory for applications demanding high fatigue strength if care is taken to avoid sharp corners and abrupt changes in section. Portions of a casting that are highly stressed should be provided with liberal fillets blended into the body of the casting. The edges of cored holes and webs should be beaded. Stud bosses should be of ample size and good radii provided at their bases. The length of stud threads should be 2½ to 3 times the diameter for those carrying high stresses. When magnesium alloy castings replace aluminum, increases in wall sections are seldom required. When they replace

*Abstract of a paper presented at the National Aircraft Production meeting of the Society of Automotive Engineers at Los Angeles, Cal., Oct. 7 to 9.

malleable iron or steel a redesign of the important sections is generally necessary. Even if the volume be doubled, which would be an extreme case, the resultant magnesium casting would have only one-half the weight of the original. The elastic modulus of magnesium is but two-thirds that of aluminum.

Steel shafts may be run directly in magnesium castings where ample lubrication is provided and where the bearing load and speeds are not excessive. Where this is not feasible, iron or steel inserts can be cast in the magnesium body. Magnesium does not alloy with iron or steel and many castings are made in which iron inserts or steel pipes are cast in place.

Soundness and freedom from harmful porosity can be obtained in the castings to a marked degree. It is seldom necessary to impregnate a casting to seal it and pressure tests of 100 lb. per sq. in. are a part of many specifications.

Magnesium sand castings differ from castings of most metals in that there are means of controlling the grain size and eliminating to a large degree internal porosity. Pin hole porosity does not occur. Microshrinkage affects the mechanical properties in proportion to its occurrence. Fortunately its amount and location in a casting are subject to some control and when the amount is held within normal limits the properties are but little affected.

These magnesium alloys are not seriously affected by low temperatures, and investigations indicate that the tensile and yield strengths decrease and the elongation increases with rise in temperature. These changes are not serious up to 400 deg. F. Present information indicates that the following design stress factors modifying the standard properties should be used for design:

		FACTOR		
Condition	Designation	200° F.	300° F.	400° F.
As cast	C	0.92	0.80	0.65
Heat treated	T4	0.92	0.80	0.65
Heat treated and aged.	T6	0.90	0.60	0.40

Inspection Methods

Routine foundry inspection involves an examination of the castings for visual defects such as shrink cracks, misruns, sand holes, and dimensional faults. It is of greater importance to guard against the production of castings which have internal defects and to change the foundry practice to correct the trouble. This type of inspection requires frequent fracturing of the castings in all sections and generally leads to a system of gating and chilling which will produce the maximum soundness. Occasional static breakdown tests are made to determine the overall strength of the casting.

The examination of magnesium alloy castings by means of X-radiographs is of value for detecting gross defects, such as blowholes and shrinkage cavities. The radiograph, however, is of little aid in showing the presence of the extremely fine dispersed shrinkage, sometimes termed microshrinkage. It is possible to reveal this microshrinkage in thin plates by means of X-ray, but because of the ease with which they penetrate the low density alloys the contrast on the photographic film between solid metal and slightly unsound areas is not very great.

Machining

Magnesium castings have excellent machining characteristics. They do not drag or tear, can be cut at high speeds and feeds, and take a fine smooth finish. Magnesium cuts so easily that standard tools used for other metals may be employed. For maximum economy, however, these should be of slightly different design. The principles which effect these changes are the low cutting resistance, the low heat capacity of the metal and the large volume of chips produced by the easy and rapid cutting. The low cutting resistance leads to high speeds and heavy feeds and a tool design is necessary that will dispose of the chips rapidly and smoothly without jamming and developing frictional heat. Under any frictional conditions, the low heat capacity of the metal will produce higher temperatures in tool, chips and work than with other metals.

It is important to maintain the cutting edges as sharp and smooth as possible and free from grinding wheel scratches. In addition to rapid cutting this aids in chip flow.

Because of the ease of cutting and the small amount of frictional heat generated with sharp and properly designed tools, magnesium castings can usually be machined without lubrication. Under certain conditions the use of a lubricant may be desirable. In such cases a lubricant with the lowest water content should be selected. Kerosene or mixtures of equal parts of kerosene and lard oil are recommended. Good standard cutting compounds are also suitable.

The fire hazard in machining magnesium is slight and if proper tools and methods are used ignition of the turnings can be avoided. Adverse conditions are the use of very fine feeds, dull or chipped tools, small clearances, inadequate chip space and high cutting speeds. In those cases where fine feeds and cuts and the highest speeds are necessary for quality and economy, a lubricant should be used.

Stability

Magnesium alloys in general are resistant to alkalies, fluorides, chromic and hydrofluoric acid, but are attacked by mineral and organic acids and by chloride solutions. Experiments are indicating that, except in hot and humid atmospheres, the alloys do not corrode as seriously as formerly expected, even when exposed to sea air and spray. When the temperature and humidity increase, the rate of attack is accelerated. It is not often possible to predict where magnesium products will be used and consequently safe practice dictates that magnesium castings should be protected with properly applied paints of an approved type which will protect the surface even under the most severe conditions.

A number of chemical coatings have been developed in recent years which afford considerable protection to the metal surfaces. The acid-dichromate coating is most extensively used. It is applied by dipping the casting for a minute or two in a solution containing nitric acid and sodium dichromate. Following this treatment, the casting should be primed with a zinc chromate primer. At least two finish coats should then be applied. For the most severe service the oil base phenolic resin (bakelite) enamels or an oil base phenolic resin varnish pigmented with Albron paste is recommended. These types can be baked at temperatures up to 250 deg. F. and for the best results both the primer and finish coats should be baked for one hour at the above temperature.

The magnesium alloys used in castings have a density of about 1.8. They have therefore but two-

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More than $2,000,000 worth of

Molybdenum-Tungsten High Speed Steel

is being consumed this year. The consumers have shifted to MO-MAX for quality and quantity production because they have found it makes better tools. These facts prove that MO-MAX has established itself as a superior high speed steel. Its use in the plants of consumers has demonstrated that—

- MO-MAX requires 8% less weight of steel to make a tool.
- MO-MAX is easy to weld.
- MO-MAX is easy to forge.
- MO-MAX is easy to machine.
- MO-MAX is easy to grind.
- MO-MAX tools are harder.
- MO-MAX tools are tougher.
- MO-MAX tools have superior cutting quality.

Leading steel companies in North America and Europe are now licensed to make MO-MAX. A booklet giving the essential data may be obtained by addressing The Cleveland Twist Drill Company, Cleveland, Ohio.

MO-MAX is a proprietary name owned and controlled by The Cleveland Twist Drill Company and its only licensed use by others is on steel made and sold by licensees under U. S. Patent Nos. 1,937,334 1,998,953 1,998,954 1,998,955 1,998,956 1,998,957 and Canadian Patent Nos. 346,506 364,032 and 364,033.

SALES OF MO-MAX BY 3 MONTH PERIODS

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SALES OF MO-MAX BY 3 MONTH PERIODS

thirds the weight of aluminum and less than one-quarter the weight of brass or malleable iron. This characteristic is the basis for practically all of the present day applications. The aircraft industry early perceived the possibility of decreasing the weight of engine castings and of many parts in the fuselage through the use of light weight castings. It was the interest in magnesium castings by aircraft engine manufacturers that justified the early development work.

Aircraft uses constitute approximately 70 per cent of the present production. In industries outside of aircraft, magnesium castings are finding many uses where light weight is important. Examples are portable parts of pneumatic and electrical grinding and drilling tools, bread slicing machine frames, for motion picture equipment and sound cabinets, for foundry flasks, patterns, match plates and core boxes, for jigs and fixtures in machining operations and for certain parts of trucks, buses and coaches. Magnesium castings are more expensive to manufacture than castings of other metals and their use must be justified by the weight saving and machining characteristics. The cost trend, however, is in a downward direction.

Plastics in the Aircraft Industry*

By G. P. YOUNG
Röhm & Haas Co.

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LOW specific gravity and great strength per unit weight are of primary importance in aircraft construction, and since many plastics are characterized by these particular properties, consequently they have been widely studied by aircraft engineers.

In general, synthetic plastics are divided into two classes, thermosetting and thermoplastic.

The most common thermosetting plastics are prepared by the reaction of phenol and formaldehyde or urea and formaldehyde. Bakelite is a typical example of this group. These plastics are manufactured as granular materials which are shaped or molded under heat and pressure and then become infusible.

Thermosetting Plastics

The thermosetting plastics have proven suitable for use in aircraft, due to their excellent electrical insulating qualities, abrasion resistance, and the possibility of molding them into complicated irregular shapes. Due to their good insulation, they have been used in ignition systems. Small insulating parts can be stamped to the required shape from sheets of thermosetting plastics. Their high abrasion resistance has been utilized in control pulley, cable guides and abrasion strips. Molded parts such as instrument cases and control lever knobs have been widely employed in aircraft. At one time, propellers were made by laminating a fabric impregnated with a thermosetting resin. Unfortunately, these propellers broke, apparently due to fatigue failure. Since we now know more about the stresses in propellers, and possess a better understanding in regard to their speeds, design, and vibration, it may be possible that a satisfactory plastic propeller can be manufactured.

One disadvantage which has limited the use of thermosetting plastics in aircraft is, that unless many thousands of identical molded pieces are used, the mold cost per unit is exorbitant. Since increasing numbers of aircraft of the same design are now being produced, it is to be expected that the use of molded plastics by the aircraft industry will be rapidly expanded.

Cellulose acetate, cellulose nitrate, and the acrylic plastics are characteristic thermoplastics. These resins do not react under heat and consequently can be reformed or remolded under the repeated application of heat.

Thermoplastics are used in aircraft in dopes, in the form of molded items, and in transparent sheets for windows, windshields, gun turrets, and cockpit enclosures.

Dopes are actually solutions of thermoplastics in organic solvents. Cellulose nitrate was first used in this application, but due to its inflammability it has been replaced gradually by cellulose acetate. Films of these cellulose esters seem to have the unusual property of tautening a fabric upon which they are dried, whereas other resins show this action to a much lesser degree. The big difficulty with dope films has been that they would not withstand the action of actinic light from the sun, unless protected by a pigment. Pigmented dopes were, therefore, used as finishing coats to give protection to the clear base coats, and to produce the desired color.

Thermoplastics have been widely employed as the intermediate layer in laminated glass used in aircraft. Cellulose nitrate was also the first plastic to be employed in this application, but it proved unsatisfactory due to its yellowing and decomposition when exposed to sunlight. Cellulose acetate was then used in laminated glass, and more recently the acrylic and vinyl resins have been found to offer many advantageous properties for use in this field. Although laminated glass has been used to a large extent in aircraft due to its shatterproof properties,

(CONTINUED ON PAGE 122)

* Abstract of a paper presented at the National Aircraft Production meeting of the Society of Automotive Engineers at Los Angeles, Cal., Oct. 7 to 9.

Cutting down reject percentages in difficult castings

● THE difficulties ordinarily encountered in bringing large castings of varying sections safely out of the mold have been strikingly demonstrated in one foundryman's experience with hoisting drums. With the usual carbon cast steel, the spokes had a tendency to pull away from the drum on cooling. Cracks and breaks brought the rejects to a discouraging percentage.

● By the simple addition of Molybdenum, the solution was found. The better casting qualities of Moly cast steels are explained in this now widely recognized technical fact: The expansion of steel, cooling through the transformation point, is virtually eliminated by the addition of Molybdenum. The effect reduces the likelihood of cracked castings, especially in those having radical differences in section.

Our technical book, "Molybdenum," contains practical data on Moly irons and steels. It will be sent on request — as will also our monthly news-sheet, "The Moly Matrix." Be free to consult our laboratory on special ferrous problems. . . . Climax Molybdenum Company, 500 Fifth Avenue, New York City.

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JANUARY 7, 1937

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ANNOUNCING

»The 1938 Annual Review Number of The Iron Age to be published January 6, 1938. »It is the standard reference and statistical annual of the metal working industry, used constantly throughout the year by executives as a source of buying information. »You will surely want to be represented in it with a dominant selling message and in response to repeated requests we are publishing this early announcement so that you can include it in your advance plans for 1938. »Why not make at least tentative space reservation now?

ANNUAL REVIEW NUMBER

January 6, 1938

(CONTINUED FROM PAGE 118)

it possesses the disadvantages of high specific gravity, and the fact that it is not readily obtainable in curved sections and cannot be made at all in the form of three-dimensional surfaces.

Cellulose nitrate was the first transparent thermoplastic sheeting used in aircraft. However, its discoloration upon aging and its inflammability were serious disadvantages. Cellulose acetate sheeting was quite an improvement over the nitrate, but it, too, possesses a very limited resistance against weathering and aging. The sheet cellulose plastics, are, for the most part, prepared by slicing the sheets from large blocks and then heating and pressing them between polished metal plates. These sliced sheets, even after pressing, contain shear marks which become quite evident if the sheets are heated for forming into curved sections.

As acrylic plastic sheets are prepared by a casting operation, they contain no shear marks and can be heated without danger of the appearance of surface imperfections. Acrylic sheets can be readily formed into conical, spherical, or cylindrical sections free from surface irregularities. Plexiglas, the commercially available sheet acrylic plastic, is furnished in sheets from 1/16 to ¼ in. in thickness, in areas up to 12 sq. ft. This material is well-suited for stream-lined windshields and curved cockpit enclosures.

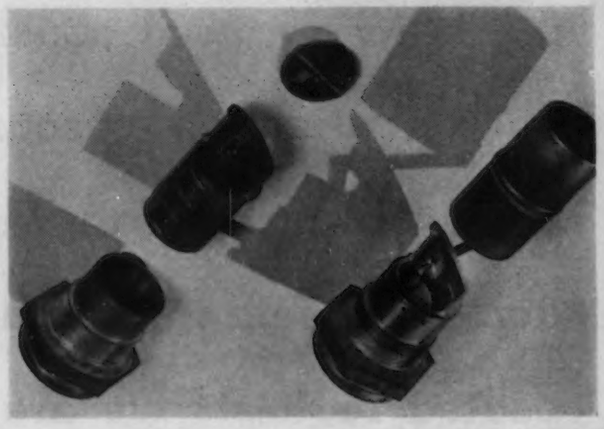
Inherently, this plastic is of crystal-clear transparency and exhibits unusual aging and weathering resistance. It is stronger than glass, yet only one-half as heavy per unit volume. The strength properties include flexural strength, brittleness, toughness, and impact strength. The surface hardness of the resin, however, is less than that of glass, and care must be taken that this softer surface is not damaged through improper cleaning or maintenance.

In addition to the uses of plastics in aircraft construction, these materials find other applications in aircraft. The saving of weight in non-structural necessary equipment, such as lighting fixtures, tableware, and decorative ornaments, is of such economic importance as to justify the use of plastics for these items in order to save valuable payload, although plastics are initially more expensive than other materials ordinarily used for these purposes.

When one considers the rapid advancement in the technology of plastics and the trend of the aircraft industry toward mass production, it seems highly probable that large molded plastic sections may soon be used in aircraft construction. Continued research on transparent plastics may lead to the development of the ideal material for aircraft windows, windshields, and cockpit enclosures.

It Saves Fuel Oil

And Consumer Good Will

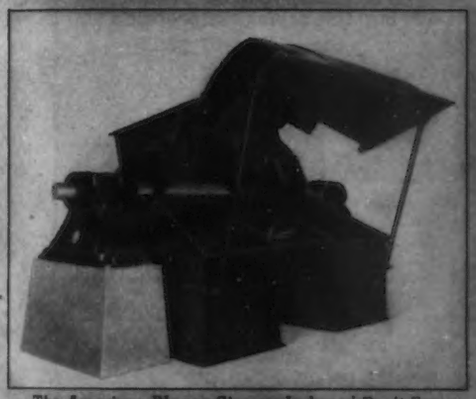


A SIMPLE but ingenious device assembled from zinc alloy die castings has been developed by American Injector Co. designers, to overcome certain balky customer relations problems faced by suppliers of fuel oil for domestic heating equipment—to wit, the spillage of oil on customers' lawns and driveways, the necessity of entering the customer's basement several times to make delivery, and the fuss and commotion attending mid-day visits of a tank car. In addition, the unit is purported to save oil companies as much as 20 per cent in domestic distribution expenses.

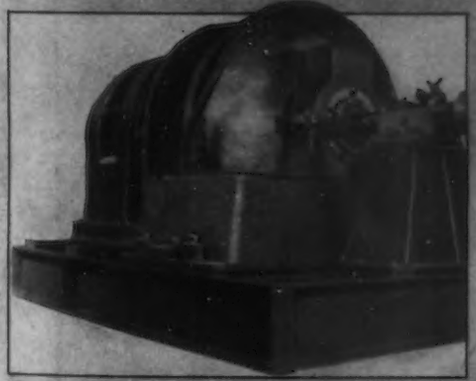
The unit shown in the accompanying photograph attaches at the inlet to the customer's storage tank and automatically closes a butterfly valve when the oil level has risen sufficiently to lift the hollow float. As soon as this valve closes, a back-pressure is communicated through the line to the delivery truck where a check valve stops oil delivery. The oil then remaining in the line between the delivery truck meter and the storage tank, drains slowly past the butterfly to give the user a full measure of fuel without danger of spillage. The telescoping length of the unit may be adjusted at the time of installation to provide for sufficient capacity leeway in the tank after valve closure to accommodate the amount of oil then standing in hose and pipe lines between truck and tank. Because of this feature, plus fully automatic operation, it is not necessary for oil delivery men to enter customers' quarters. Deliveries may be made from outside connections and at night, and no disturbing signal bell or light is needed to indicate a full tank. The low cost of this device arises from the fact that three rustless zinc alloy die castings are used to make it, which eliminate machining and finishing operations in production, but yet provide all the niceties of detail required.

3 steps

to better POWER PLANT PERFORMANCE



The American Blower Sirocco Induced Draft Fan



The Hydraulic Coupling for Variable Speed Fan control

The American Blower Dust Collector for minimizing the fly ash nuisance and reducing fan erosion

Power plant engineers and executives are improving power plant performance by taking these 3 steps: (1) The application of *Sirocco Induced Draft Fans.* (2) *Hydraulic Couplings* for variable speed drive. (3) The installation of *American Blower Dust Collectors* for minimizing the fly ash nuisance and reducing fan erosion. The good news is spreading fast. It travels from power plant to power plant and from one engineering office to another. It's not the result of super-salesmanship or chance. It's built on a solid foundation of results obtained under actual operating conditions. What more need we say—except that our engineers will be glad to discuss with you the application of American Blower equipment to your present or new plant and to give you complete operating data on equipment in plants similar to yours. Your request will bring immediate action without obligation.

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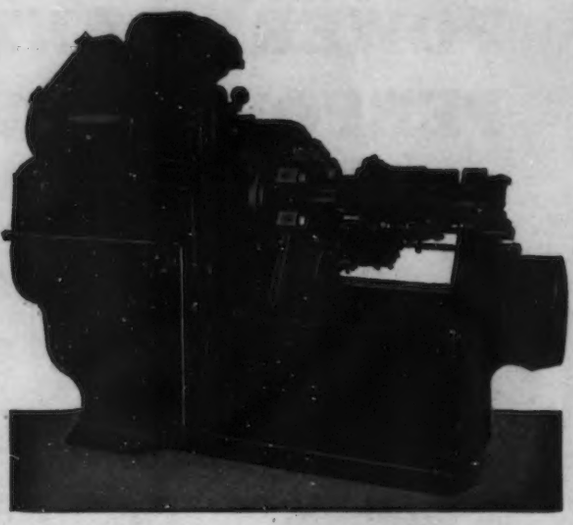
Division of American Radiator and Standard Sanitary Corp.

6000 Russell St., Detroit, Mich. **Canadian Sirocco Co. Ltd., Windsor, Ont.**

BAIRD *Machines Win Against Rising Costs*



Multiple spindles, bringing many cutting tools into play, and automatic in operation is a sure way to make those savings which must be made under today's conditions.

Designing a machine to meet these specifications without running into excessive cost or complicated construction is a neat job which Baird has successfully performed.

Baird Automatic Multiple Spindle Chucking Machines will machine pieces up to 10½" diameter held in chucks or on centers. These machines are of horizontal and vertical types. Their speed and accuracy have cut production costs in many plants, and if you want to know how big the savings are—just send a sketch of one of your pieces. We will gladly give you a reliable estimate.

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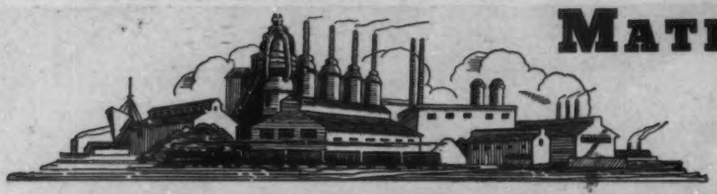

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FURTHER INFORMATION WILL BE FURNISHED ON REQUEST

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JUST BETWEEN US TWO

Near Nixies

NO word yet from Phil (GE) Sowersby as to whether he got that test letter we addressed to him care of General Electric Co., Schenectady, N. Y., without street address.

But whether or not the Schenectady P. O. runs GE down, there is something else we want to squawk about and that is the habit some firms in foreign countries have of leaving the name of the country off the letterhead. Only this morning a letter came in from a firm whose letterhead announced that it was located in Trivandrum—and nothing more.

The philatelical kleptomaniac in the mail department had removed the stamp as usual. And as one who does not even know what country owns the Free City of Danzig, we had to dust off the gazetteer. Trivandrum is in South India and the letterhead should have said so.

Blurb

AS far back as we thought it safe to look, no other September beat last month in the number of new faces in the one big, fairly happy family.

Loud "Amen"

THE anonymous "S.W." seconds J.V.S. Bishop's Bronx cheers for our editorials with this:

"My compliments to him and a large 'Amen' to his remarks."

He can, he says furthermore, discern no difference in purpose or result between The Iron Age and Walter Lippmann, however, they may differ in speech or method. Lumping us with the incomparable Walter makes us purr.

Oil for Costive Currency

ARE we interested, a Pacific Coast manufacturer wants to know, in an idea for improving the monetary system? We told him yes but to send it to the editors who are up on things of that sort.

An idea we have for an improvement in our own personal monetary system is something we have often broached to the Oberleutnant, with no success, the O. being a hard money man of the Adam Smith School.

Stoppers

"Main Street . . . My Foot"—The R. K. LeBlond Machine Tool Co.

"In Quarantine for You"—Crane Co.

"Dangerous if They Escape . . . yet safe as the water in a glass!"—Lebanon Steel Foundry Co.

Anti-Bromider

OUR favorite technical writer is Tom Lippert, The Iron Age's metallurgical editor, who makes his story, "10 Cu + 18 Cr + 72 Fe," in the Oct. 14 issue, glisten with such gems as:

". . . solidifies like mother's raisin pudding . . . shot through with gobs of copper-rich alloy, the latter often as big as golf balls . . . this mixture so heavily enceinte with copper . . . about as satisfactory as rolling a sponge full of water . . . a hell of a mixture erratically immiscible."

Think of the Children

THE propriety of spelling "hell" right out like that in a family journal is questionable. But there are times when it is unavoidable. For instance, we learn through the Foundry Trade Journal (England) that in the sacred mountain of Kiuhwashan, China, the world's largest bell is now being cast. It will be rung to help the souls of lost Buddhists find their way toward salvation, and will be known as the "Bell of Hell."

Zephyr on the Loose

AWED is what we were with this from a Buick ad about the new Dynaflash engine:

"Speeding through the raceways of the intake manifold, this explosive vapor hurricanes into the cylinders at speeds around 250 miles an hour . . . Turbulator . . . flings the hurtling mixture into air-swirls of terrific turbulence . . . and the spark that leaps through that compact storm-center sets off a flashing cyclone of power, exploding with tornadic force."

Gosh!

—A.H.D.

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ABRASIVE CLOTH & PAPER
Norton Co., Worchester, Mass.

ABRASIVES—Steel Shot and Grit
Pangborn Corporation, Hagerstown, Md.

ACCESSORIES—Welding
Lincoln Electric Co., The, Cleveland.

ACCUMULATORS—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Hydraulik Gmbh. Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Wood, R. D., & Co., Philadelphia.

ACETYLENE—Dissolved in Cylinders & Small Tanks
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

ACID-PROOF CEMENT
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

ACID-PROOF CONSTRUCTION
Atlas Mineral Prods. Co. of Pa., The, Mertztown, Pa.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

AIR CONDITIONING EQUIPMENT
American Blower Corp., 6000 Russell St., Detroit

AIRMETERS AND VOLTMETERS
Weston Electrical Instrument Corp., Newark, N. J.

AIR TANKS AND CYLINDERS
Scaife, William B., & Sons Co., Pgh.

ALLOYS—Copper
American Brass Co., The, Waterbury, Conn.

ALLOYS—Ferro
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Magnesium
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ALLOYS—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Phila.

ALLOYS—Resistance Welding
Electroloy Co., Inc., 50 Church St., New York City.

ALLOYS—Titanium
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

ALLOYS—Tungsten
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

ALLOYS—Vanadium
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

ALLOYS—Zinc Base Die Casting
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ALUMINUM
Aluminum Co. of America, Pittsburgh.
Seligman, Arthur, & Co., Inc., 30 Rockefeller Plaza, R. C. A. Bldg., N. Y. C.

AMMETERS AND VOLTMETERS—Recording
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AMMONIA RECOVERY PLANTS
Koppers Co., Pittsburgh.

ANGLES, BEAMS, CHANNELS AND TEES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

ANGLES, BEAMS, CHANNELS & TEES —Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ANNEALING—See Heat Treating

ANNEALING BOXES
Lebanon (Pa.) Steel Foundry.
United Engineering & Fdry. Co., Pgh.

ANNEALING COVERS
Surface Combustion Corp., 2375 Dorr St., Toledo.
Wilson, Lee Engineering Co., The, Cleveland.

ANODES—All Types
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Seymour (Conn.) Mfg. Co.
Udylite Co., The, Detroit.

ANODES—Cadmium
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.

APPAREL—Welding
Lincoln Electric Co., The, Cleveland.

ARBORS
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARMORING MACHINERY—Cable, Wire, Hose
Sleeper & Hartley, Inc., Worcester, Mass.

ARRESTERS—Spark
Harrington & King Perforating Co., Chicago.

ASBESTOS
Carey, Philip, Co., The, Cincinnati.

AXLES—Car or Locomotive
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BABBITT METALS
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.

BALANCING MACHINES — Static Dynamic
Gisholt Machine Co., Madison, Wis.
Olsen, Tinius Testing Machine Co., Philadelphia.

BALING PRESSES—Scrap — See Presses —Baling

BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.

BALLS—Steel, Brass or Bronze
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Acme Steel Co., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Ransohoff, N., Inc., Cincinnati.

BARRELS—Tumbling
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Ransohoff, N., Inc., Cincinnati.
Whiting Corp., Harvey, Ill.

BARS—Alloy
Republic Steel Corp., Cleveland, Ohio.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

BARS—Concrete, Reinforcing
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARS—Flux
Si-Lux Co., Pittsburgh.

BARS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

BATTERIES—Storage
Electric Storage Battery Co., The, Phila.
USL Battery Corp., Niagara Falls, N. Y.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BEARINGS—Ball
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.

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